THESIS

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Simplified project plan of Lenovo retail store construction

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Content

1. Introduction

The first chapter is mainly about the theme and main content of this thesis. I expressed the motivation for writing this thesis and the questions I wanted to explore. I introduced the functions of new Lenovo retail stores, so you can have an overall image of the finish-built retail stores.

1.1 Why is this topic useful

I believe you must be familiar with the logo “Lenovo”. The personal computer produced by this company is sold in almost all media-market in the world. Lenovo is a Chinese technology company. Since entering the top 500 enterprise list released by “Fortune” Magazine in 2011, it has entered the list for 13 constant years. In 2023, Lenovo ranked 217 in the list. By reading this paper, you will understand the development history of Lenovo and its enterprise culture.

The main content of this paper is about Lenovo's retail store project. Now Lenovo is indeed promoting its own retail store construction project in China. Today the Internet is popular, people start buying online. Online shopping can make you buy products without leaving home, so save time and avoid shopping tiredness; because it omit the middle part of the product from the manufacturer to the retail store, it omit the cost of running offline retail store. So you can spend lower price to buy goods. Why Lenovo invest huge resources to build its own retail store when online shopping is popular? The popularity of the Internet has accelerated the generation of data, will big data affect the retail industry? These interesting questions can be answered in this paper.

The most important thing is that the theme of this paper is project management. You may not intend to build your own retail store. You may not be a project manager. You may never take any project management lessons. Project management seems to have nothing to do with you, far from you. But in fact, it has a lot to do with you. You must have organized a birthday party, planning a birthday party is a process of project management. From hosting parties, trip to building rockets, they are all projects. Reading this paper, you will learn the basic project management knowledge, so as to better plan your life.

1.2 Why is this topic interesting for people

1.2.1 Lenovo retail store will provide better customize service

Personal computer is a necessity of people's lives and work in the 21st century. PC (personal computer) means “personalization”, not only the data is personal, but also includes the hardware configuration of the computer and the appearance of the computer. Lenovo Retail Store focuses on personalization. The store has a personal customized area and provides full-quality personal customization services, including providing personalized appearance jet, exclusive engraving, customized hardware options and other services.

1.2.2 Lenovo retail store will provide more ways of business

Lenovo Retail stores provide consumers more ways of business. In the current O2O business model, it is mainly combined with online payment and offline freight, and then the merchant chooses a logistics outsourcing method to transport the product to your designated place. But in new retail store, In addition to the O2O business model, Consumers can also purchase offline and pay online, and they can also pay online and go to store to pick up goods. In addition to buying the products of the exhibition, consumers can also order online through the O2O large screen in the retail store.

1.2.3 Lenovo retail store will provide good on-site experience of the product

The characteristics of the products sold online are very obvious. They are limited to special products with low sensing experience, listening, touching, and smelling of buyers. The current personal computer has evolved in the direction of intelligence. Only by allowing customers to have a good experience for intelligent products, it will increase the confidence of customers' purchase. Lenovo retail stores pay attention to on-site experience, and consumers can experience various smart new products in the store.

1.3 Why I choose this topic

Nowadays, online shopping is becoming more and more popular, and the traditional retail store industry has been impacted by a lot. Some people choose to buy everything online. However, some well -known brands offline stores still have a large number of consumers, such as Apple, LV etc. Why are offline retail store of these companies still popular? Why some famous Company still want to build the retail store of their own brand. So I want to choose "simplified project plan of Lenovo retail store construction" as the thesis topic.

1.4 Goal of writing this title

Lenovo's retail store provides product customize services, which means the management of big data. The products in Lenovo retail stores can also be purchased online, and the price of online and offline is the same. In addition, you can experience the product in the store, including Lenovo's most advanced technology, such as VR and smart devices. Then how to put such a new Lenovo retail sore into running? Through writing this thesis, I want to learn the application of project management tools and find out what new retail stores in the era of big data look like.

2. Literature review

In Literature review, based on some experts' books and their research, I briefly introduced "big data", the basic knowledge of project management, and some caution you should have when doing a project. Even if you have never taken any project management class, you can easily understand this chapter.

2.1 retail store industry in big data

2.1.1 Basic definition of big data

What is big data, it is easy to understand from the literally that it should refer to a large amount of data. Many benefits brought by the information age are obvious. For example, everyone has a mobile phone, each office has a computer, and each cafe has WIFI and so on. But at the same time, there is one thing that have greatly changed people's lives but people ignore it, that is data. Over the past half a century, as computer technology has been fully integrated into social life, the information explosion has accumulated a degree to start to cause change (Big Data: A Revolution That Will Transform How We Live, Work, and Think, Viktor Mayer-Schönberge, 2012).

The concept of big data originated from astronomy and genetics. They are the earliest disciplines to experience information explosions. For example, the Large Synoptic Survey Telescope, located in New Mexico, has collected more than all data in the astronomical history in just a few weeks when it was launched in 2000. In 2003, human beings completing the alkaline-based segmentation, and the interpretation of the genetic password took 30 years. In 2013, a genetic instrument can complete 30 years of work in 15 minutes. What happened in astronomy and genetics still occurred in other fields. For example, data Google handle everyday is thousands of times more than data recorded by all paper publications in the National Library of the United States. From scientific research to medical insurance, from the banking industry to the Internet, all different fields are telling a similar story, that is, the amount of data of explosive growth (Big Data: A Revolution That Will Transform How We Live, Work, and Think, Viktor Mayer-Schönberge, 2012).

A new type of influenza virus H1N1 appeared in 2009, which quickly spread in a few weeks. However, due to the delay of information dissemination, the America "centers for disease control and prevention" failed to prepare it in time. However, Google Company predicted the outbreak of influenza in the "Nature" magazine a few weeks before the outbreak. Google uses mathematical models to process a large number of search word regulations such as "What medicine do you need to take when catch a cold" and so on, and then compare the results with data from the "Center for Disease Control and prevention". As a result, Google found that the prediction results of their software and the correlation with official data were as high as 97%. As Google has reserved many years of search records, huge data resources are enough to help Google complete the study. Big data is changing our way of life and understanding the world, becoming the source of new inventions and new services (Big Data: A Revolution That Will Transform How We Live, Work, and Think, Viktor Mayer-Schönberge, 2012).

2.1.2 Big data change the traditional retail store industry From scientific research to medical insurance, from the banking industry to the Internet, all different fields are telling a similar story, that is, the amount of data of explosive growth. (Big Data: A Revolution That Will Transform How We Live, Work, and Think, Viktor Mayer-Schönberge, 2012), and the amount of data of explosive growth in the retail industry also occurs. So how is the retail industry affected in the era of big data? The expansion of retail store companies to the Internet field, the intervention of social media, and data from the supply chain and operation have made the data of the retail store industry more complicated than ever. Now every retail store has two options, throw those data into garbage or analyze and use it. In fact, more and more retail store companies start to think about how to use this data to help themselves to get the lead in the competitive retail industry.

One of the impacts of big data on the retail industry is that the decision -making of retail stores Company will be effectively supported by it. In terms of marketing decision-making, for example Retail companies can pricing products through big data assistance and know to whom, how, when the company should promotes the products. Each customer has different purchase habits, and has different interest preferences and brand preferences during shopping. Big data as commercial intelligence and analysis technology allows retail store companies to track the source of a certain data throughout the entire product or service process. So retail store Company can know customer's habit and preferences and Analyze the scale, structure composition (such as age, gender, etc.) of the consumer group. After analyzing the retail store company can estimate consumers' willingness to buy, and decide to provide products that meet customers' interest and preferences, and achieve precise marketing.

Big data solutions can also help them get internal capabilities, including organizational agility and operation optimization, thereby bringing competitive advantages and commercial value. In terms of company competitiveness, for example, with the help of big data the performance of various stores, employees work tasks and customer feedback can be obtained quickly and accurately. Through the understanding of each employee's work state, the retail store company can reasonably allocate work task, adjust working hours and participation, so as to reduce the cost of employees without reducing the level of service. In terms of market response, people in different regions have different income levels and shopping preferences. Since big data can make retail store companies better understand consumers' behavioral preferences than consumer themselves, retail companies can develop different strategies for market of different regions. In terms of environmental adaptability, big data allows retail store companies to analyze the sales history, even weather information, road conditions, oil prices, etc. Therefore, retail companies can reduce the inventory and logistics fluctuations caused by environmental changes. By digging and using big data, the competitiveness of the retail store company can be enhanced, the market response is keen, marketing decision-making and environmental adaptability got improved (The retail industry in the era of big data, Wan Zhitao, 2015).

2.2 Project is different from daily routine

Our daily work also always have teamwork, and the boss also often check the progress of daily work, but projects and daily work are different. For example, a candy factory produces their most popular candy in the market. This is the daily work for this factory. This production line must produce a certain amount of candy everyday, put the candy into the outer packaging, etc. These are the daily works. One day the factory decided to produce a new flavor and color of candy that they had never produced before. A team was formed to responsible for introducing the production line for this new type of candy. Until the production line for this new type of candy is accepted, it is a project. After, the production for this new type of candy will become daily works. The characteristic of a project is that produces a unique product, service or result that was not previously available (Project management jumpstart, [US] Kim Heldman, 2022).

2.3 project cycle

2.3.1 Project preparation phase

The project cycle has different versions in different books, but no matter what version, the project cycle can be summarized by the project preparation phase, the planning and risk distribution stage, the project implementation stage, and the project evaluation stage. Each stage has its own characteristics.

All projects originated from a concept, and this concept is blurred (Fundamentals of project management, Joseph Heagney, 2016). These blurred concepts include the mission and vision of the project, problems to be solved. The project itself is to solve the problem for the company. The problem may be positive or negative. Creating a new product is a positive problem, and solving environmental pollution caused is a negative problem. If the team wrongly understands the mission and vision of the project, and does not agree on the problem to be solved, it is useless to find the solution to the problem. Because the project team does not understand what problem the company wants to solve at all. In the project preparation phase: firstly defines the problem that the company wants to solve, and transform company's strategic goals into project, there will be many project ideas. Therefore, secondly must do feasibility analysis of the project ideas, and thirdly select the most suitable project idea. During the project preparation phase, the blurred project concept is transformed into a clear project result, delivery date, budget.

2.3.2 Planning and risk distribution phase

When the project concept is clear, the project enters the second phase, that is, the planning and risk distribution phase. Planning means to make strategies and tactics for completing the project. The strategy decide project will adopt a high -level method to meet the requirements of the company's senior management (Fundamentals of project management, Joseph Heagney, 2016). For example, in terms of the project "Lenovo Retail Store Construction" the requirements of the company's senior management is to build a new retail store and let it run. However, Lenovo is a computer manufacturing company not construction company. So Lenovo has to choose the method of outsourcing, this is strategy. If you choose to outsource the construction work, then you must choose a suitable construction contractor to sign a contract that is

beneficial to both parties. This belongs to tactics. All tactics are one–level lower planning than strategy. Generally speaking, the planning and risk distribution stage, the first is to formulate strategies and tactics for the project implementation, the second is tendering, and the third is to sign the contract. WBS, Gantt-chart will be created at this phase.

2.3.3 Project implementation phase

When the project plan is approved, the project can officially be implemented. The project implementation phase includes two parts. One part is to complete the planned project work, and the other is to control the project based on the plan set in second phase of project cycle. Once the plan is abandoned, the team will lose control of the project, because there is no control without planning. (Fundamentals of project management, Joseph Heagney, 2016) For example, if you do not strictly follow the work packages of different levels of WBS, you cannot control the work of project implementation. Project plan consume time and money. If the work is not carried out in accordance with the project plan or when the project team encounters a little setback, they do not follow the project plan. It is a waste of resources. When the encountering difficulties during the implementation phase, project team either corrected and make it return to the project plan or modify the plan, such as modifying WBS, Gantt-chart, and continue to work when new plan are approved by the company's senior management.

Another part project control is an information system that helps the project manager to make the correct decision during the project implementation phase. The project manager determines that the project progress is advanced or backward, whether the expenditure is within the budget through some information such as budget cost, actual cost, work scheduled by Gantt-chart, etc. Project control generally has four steps. The first is to establish standards. In fact, some standards have been formulated in the planning and risk distribution phase, such as WBS, Gantt-chart. The second is to observe the work performance and collect information. The third is to analyze information and compare the collected information to the standards. The fourth is to make a decision to correct it. In a word, According to the nature of the work, after using any available tools to evaluate the number and quality of the completed work, compare the evaluation results with the plan (Fundamentals of project management, Joseph Heagney, 2016).

2.3.4 Project evaluation phase

When the project is accepted, the project is not completely ended, and will goes to the fourth phase of the project cycle also the last phase - the project evaluation phase. Many project teams often ignore this step after the project is successful. The main work of the project evaluation phase is to evaluate the success of the project and the project process. The purpose is to find the mistakes made during the project and learn good experience. For example, next time encountering similar projects, the same project team takes over, optimize the use of raw material, reduce project time and so on. If this phase is ignored, resources and time will be wasted again on the same mistake. The project must be summarized during the end of the project. The purpose is to summarize the lessons for future reference. You can ask two questions: "Where do we do well?" "Where do we need to improve?" (Fundamentals of project management, Joseph Heagney, 2016).

2.4 Capital investment project and its risks

According to the project results, project can be divided into three categories. They are capital investment(engineering) projects, research and develop projects, and organizational development projects. If a project's final product is a new facility, then this project is a capital investment project, generally it involves construction. For example, building a retail store, decorating a retail store, moving the retail store to another place, or shutting down the retail stores are capital investment projects. The risks in the implementation of construction when doing a capital investment (engineering) project are full of uncertainty factors, and risks are also diverse. If risks cannot be effectively managed, it will easily cause the company to suffer economic losses and waste of resources. When working on a retail store construction project, if the weather is bad or the geographical location is not good, the construction work will become difficult. Once Relevant regulations or law on construction have changed, and the construction of retail stores will also be affected. Inflation, rising market prices in raw materials will directly affect the project's budget. The external risk of engineering projects mainly refers to the risks caused by the many uncertainty of the construction environment. There are three types, they are natural risks, political risks and economic risks (Risk Types and management countermeasures for construction engineering projects, Jiang Changwei, 2017).

In addition to the external risk caused by uncertainty of the external construction environment. Some of the uncertain factors in the engineering project (capital investment project) itself will also lead to internal risks such as quality problems, progress, budget issues, and safety issues. The internal risks of engineering projects are mainly technical risks and non -technical risks (Risk Types and management countermeasures for construction engineering projects, Jiang Changwei, 2017). The equipment selected during the construction of retail stores is not advanced, the application of new technologies and new methods has failed. After the construction is completed, the acceptance of retail stores does not follow the regulations and son on. The loss created by these factors is technical risk. project managers doesn't match the project, the purchase strategy mistakes cause the expenditure over budget, and did not well controlling and monitoring the project process cause construction of retail stores to fail to be completed as schedule and so on. The loss caused by these factors is non-technical risk.

2.5 Usefulness of WBS (work breakdown structure)

2.5.1 When WBS are created

Regardless of industry, projects discipline, or the required delivery result of project. All projects have the project life cycle, that is, the project preparation phase, the project awarding phase, the project implementation phase, and the project post-evaluation phase. During the project awarding phase, the project implementation strategy will be created, Lenovo Company will choose the proper contractor, and allocate risks and responsibility when making contract. According to the scope of project work determined at the project preparation phase, the project manager will create WBS under construction team's participation for all scope of the project work to achieve the project goals and create the required delivery results. From the

perspective of the project life cycle, Creating WBS occurs in the early phase of the project (Practice standard for work breakdown structure, [US] Project Management Institute, 2021).

2.5.2 WBS can reduce risk

The project is a temporary work established for the development of a certain product, the company's human resources adjustment or the construction of building and so on. Due to the requirements for the results of the project, the project contains countless work packages and the project is not daily. So when team completing project, there is a lot of uncertainty. WBS is a decomposition of the entire range of work required to fulfill requirements. The minimum work package that has been decomposed by WBS is a certain and specific and non-decomposed work. WBS is a practical tool that helps the project planning team to overcome a large number of uncertainties. WBS helps to convert uncertain challenges into a series of challenges with less uncertainty (Practice standard for work breakdown structure, [US] Project Management Institute, 2021). When the uncertainty in the project decreases, the risk is also reduced.

2.5.3 WBS is standard that track and control the progress

Project control is a vital part of the project management process. Managers often need to track the progress of the project to view the real-time status of the project phase and activities during the project implementation, to understand the planned resources that allocate to specific projects including the number of hours and budget information of the project, to Measure the overall profitability and investment return rate of specific projects. To do project control well project manager need WBS, Because WBS is a hierarchical decomposition of the entire range of the work that project team do to achieve the project goals and create the required delivery results. The minimum level component of the WBS is called a work package, Work packages classify related activities and make it easier to estimate, and monitor the work. According to the earned-value based process control we need data like ACWP, BCWP, BCWS. Work package helps to get time and cost collection so WBS is important in data collection in earned-value based process control. WBS provides project management teams and project related parties a visual framework for project planning and control (Practice standard for work breakdown structure, [US]Project Management Institute, 2021).

2.6 Types of organizational structure

When a project starts, the company senior management will use different types of organizational structure. There are generally three basic types of project organizational structures. They are function organizational structures, project organizational structures, and matrix organizational structures. Function organizational structure is a traditional natural and hierarchical organizational structure. The employee reports to the functional manager, and the functional manager reports it to the higher-level manager. The Finance department, the Human Resources department, and the Marketing Department are different functional organizations/department. The project organizational structure is an organization or team specially established for a project. In order to ensure the smooth information, the project team members work at the

same location. All project members report to the project manager. Matrix organizational structure refers to the organizational structure that a project team members need to report to multiple leaders, and multiple leaders include one functional manager and at least one project manager. It is an organizational structure that combines function organizational structures and project organizational structures, and try to reduce their shortcomings. One obvious difference between these three organizational structures is the communication channel or order chain. The relationship between the project manager and the various management levels, whether the information can be spread smoothly between the project manager and the company's senior management will greatly affect the power of the project manager. A project manager who is mainly working with the operation level manager is likely to be less power than a project manager who works with a middle or strategic level manager (Project management jumpstart, [US] Kim Heldman, 2022).

The key element of determining the type of organizational structure is the willingness of company's senior management and degree of power that company senior management authorize the project manager. The organizational structure determines the power of the project manager. In the function organizational structure, the project manager's power is the smallest, and their positions are even only project coordinators. In the project organizational structure, the project manager has the most power, and the project manager directly reports to the company's senior management. Project managers in the strong matrix organizational structure also have great power. Regardless of the project, it is important for the project manager to understand his project organization. Each project organizational structure will have a good or bad effect on the work efficiency of the project manager (Project management jumpstart, [US] Kim Heldman, 2022).

2.7 Importance of feasibility studies

2.7.1 Feasibility studies on different aspects

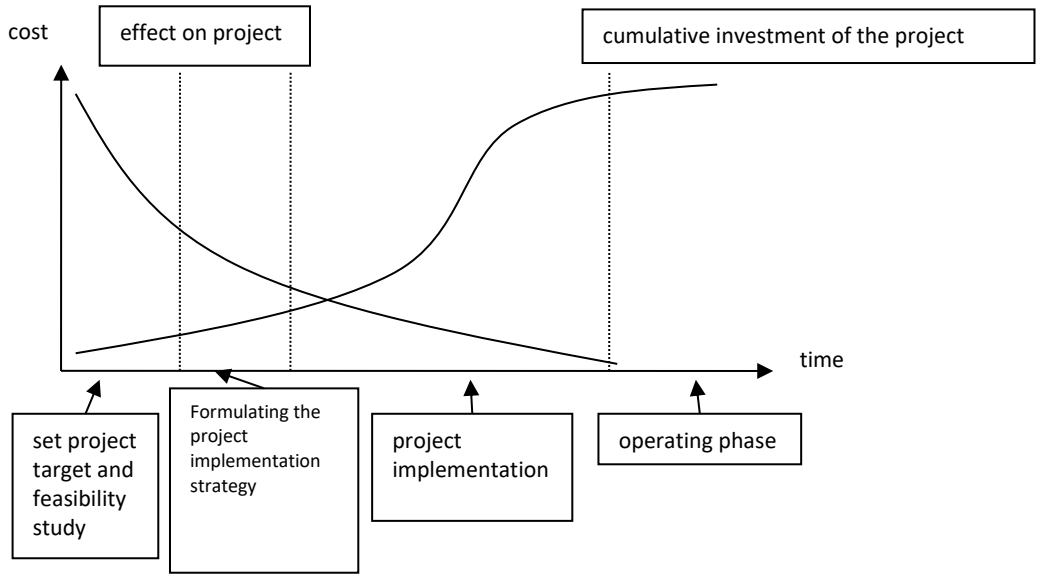
Before a project is implemented for sure, feasibility study is a fundamental and necessary work. In order to generate investment return and make the project's final success multiple feasibility analysis are required. For all projects, technical feasibility, analysis of stakeholders, financial feasibility, risks during project implementation, and the sustainability of the completed project are needed studies. When the project involves new facilities, potential location feasibility studies is needed. When the project results are going to be promoted to the market, market feasibility studies are needed. When the project has environment-polluted activities, environmental impact analysis is needed. Feasibility analysis must start from market demand and carry out the analysis of feasibility and rationality on material technical conditions, economy, environment, society and other aspects (Analysis of investment project feasibility, Wang Yong, 2017).

2.7.2 Feasibility studies' impact on project

Why should the feasibility study be performed before the project is implemented? Each project has investors, and they are part of the stakeholders. Many investors miss the step "feasibility study" because they do not understand the project management procedures or do not want to invest in the feasibility study in the project's preliminary period. As a result, It have caused more than ten times more economic losses than project

feasibility cost and also cause damage to the environment. Such things often happen. Project feasibility study is an indispensable work. Even after feasibility study, the results prove that the project is not suitable, and the money invested is worthy. The **figure 1** below shows the relationship between investment at each stage and the their corresponding impact on project.

Figure 1: Relationship between cumulative investment at each stage and the their corresponding impact on project (*Source: Analysis of investment project feasibility, Wang Yong, 2017*)



From the graph above, we can see that over time the cumulative investment of projects has continued to increase, and the impact of investment on the benefits of projects is decreasing. The cumulative investment in the project implementation period increase fastest. In the period of the feasibility study of the project, the cumulative investment increase slowly and is very small, but its impact on the project is the greatest.

2.8 budget control in construction project

Budget is one of the basic three elements of the project triangle. Building a new retail store is a capital investment project (engineering project). During the construction of engineering projects, cost management is difficult and is the key to affect the smooth progress of the project (Cost management of construction project, Song Rufang, 2023). If you want to make the project successful and reduce the budget or make the total cost of the project not exceed the budget at same time, you need to reasonably distribute risks and responsibilities between the stakeholders during the project implementation stage. Related stakeholders generally refer to client and external contributors. In the project “Lenovo's retail store construction”, the client is Lenovo Company, and the external contributor is the engineering construction team. During the project cycle awarding stage, the client sign a contract and decide the forms of payment with the external contributors. Different types of contracts refer to allocating risks and responsibilities related to the project

results and implementation process, which will indirectly affect the implementation cost. For example, the cost of building raw materials accounts for more than 70% of the cost of the entire implementation phase, so making the selection and dosage of materials clear in the contract will prevent the material over consumption. By defining claims and other content in the contract, the uncontrollable factor that leads increase cost will decrease. Contract management is the core step of the implementation cost control of construction and installation projects (Brief analysis of cost control and management of construction and installation projects under the background of new economy, Ye Qiyi, 2015). Different forms of payment directly affect implementation cost.

2.9 Common causes of project failure

2.9.1 Project manager can't complete the project plan alone

In the project preparation stage, the strategic objectives need to be transformed into a project, and the most suitable project idea is selected from many solutions. And the client sign the contract in the planning and risk distribution phase. So who can plan the project well in this two phases and get the most suitable project plan such as WBS, Gantt-chart, responsibility matrix and so on? For example, if creating Gantt-Chart all are done by project managers, It often becomes the project manager either set the time too long or set the time too short. Project managers cannot plan the project all by himself. If all the project planning work is handed over to the project manager alone, the planned project can not only be recognized, but also often loopholes. To be precise, project managers are the core figures that promote project planning, rather than the project managers formulate project plans for the entire team alone. The first criterion for project management is: those who do things must participate in the planning project (Fundamentals of project management, Joseph Heagney, 2016).

2.9.2 Detailed schedule can't lead to project success

Assuming that the project manager promotes a perfect schedule, can we say the project will be high probably successful? The answer is no, "Microsoft Project" is very popular software in the market, but the project's failure rate is still high. According to the Project Management Institute's (PMI) report "Pulse of the Profession", from 2012 to 2015 the project success rate remained unchanged, still only 64%. Although the schedule is important, no company's senior management hopes to delay the project results acceptance. However, it is more important to understand the project goal and do the work breakdown structure well. No project work is decomposed correctly at each level and the correct work package is not created, you can't plan the project well, the detailed schedule is just a memoir that clearly records failure (Fundamentals of project management, Joseph Heagney, 2016). Therefore, you can't only expect the project schedule software to plan the project well. And reality is that most people cannot understand and flexibly use the schedule software. Imagine the novices who have not been trained in the factory to operate complex machines, then the factory suffering from losses is a high probability event, and the project schedule software is the same.

2.9.3 Project sponsor can’t set P, C, T, S all

When a project is initiated, the project sponsor often requires the project manager to complete the work within the scope with a given budget, with a high performance before deadline. For example, the senior management of Lenovo Company requires the person in charge of the Lenovo retail store construction in Beijing to make the new Lenovo smart retail store start run before August 2024, with a budget of 2 million US dollars. The senior management of Lenovo Company set the project delivery time, budget, and work scope of the project, making the new Lenovo smart retail stores run means high performance of the work. If this project can be completed in the end, it is expected succeess for Lenovo's senior management. However, from the perspective of project management, project sponsor’d better not set all the project's P-performance, C-cost, T-time, S-scope. Even if a world -class project manager cannot guarantee that the project can be successful.

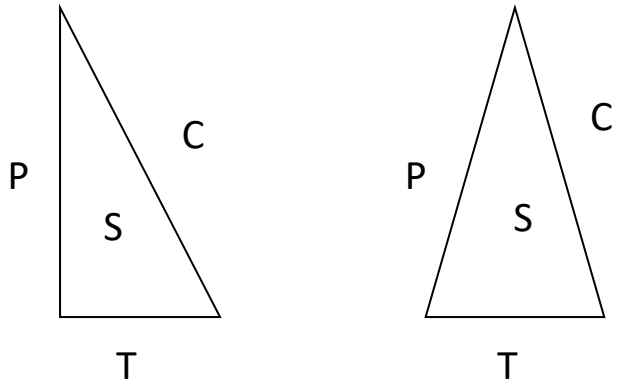
The relationship between PCTS can be represented with the function equation. C = f (x) (p, t, s). In the text, the cost (C) is a function of performance (p), time (t), and scope (s) (Fundamentals of project management, Joseph Heagney, 2016). P, T, S are independent variables and C is dependent variable. Like a triangle P, T, C are three sides of the triangle, and S is the area of the triangle. When the area of the triangle and the length of the two sides are determined, the length of the third edge can be calculated. In project management is that the project sponsor can set the three variables of the project, and the fourth variable should let the project manager decide. If the project sponsor set the performance, time and work scope requirements of a project, how high the cost can meet those requirements must be determined by the project manager. (As shown in **Figure 2**)

2.10 project marketing

2.10.1 If the project plan gets denied again and again

A project manager reported the project plan to the customer at the request and suggestion of the customer, so repeatedly. When the project plan was modified for the fifth time, the customer was still dissatisfied. When asking customers what your real needs are? The customer replied: "I really can't say what I want, but what I can say is that what you give me is not what I want."

Figure 2: The relationship between P, T, C, and S is represented by a triangle
(*Source: fundamentals of project management, Joseph Heagney, 2016*)



There is also the same problem for the Lenovo retail store project Because Lenovo's retail store is a new type of retail stores that integrate intelligence, big data management, online and offline, unlike previous traditional retail stores, the senior management of Lenovo company does not know whole picture of this new retail that will be built. Therefore, when the project manager reports the retail store construction plan to the senior management of Lenovo, the plan is constantly denied is a high probability event. There is always an unclear component at the beginning of the project, which will cause a problem - frequent changes (Minimum project management, Guo Zhixing, 2020).

2.10.2 The nature of project marketing

The project manager in charge of the construction of Lenovo Retail Store wants to let Lenovo's senior management agree and support his project plan, so the project manager needs project marketing skills. So what is project marketing? In my opinion, project marketing is to use a series of tools to obtain the support of the stakeholders' for the project, while reducing the hostility of the stakeholders who oppose the project. The steps of project marketing are generally the first is to identify the stakeholders, the second is to identify the interests of the relevant stakeholders, the third is to identify the attitude of the stakeholders to the project, the fourth is to evaluate the bargaining power of the stakeholders. The fifth is to choose the right project marketing tool, and the sixth is to make project plan pass. Project tools generally are to have stakeholders participate in decision-making, to consult the stakeholders' suggestions, to make money compensation on the bad effects caused by the project, and to use the media platform to spread projects' advantage. Realize the effective participation and expectations of all relevant personnel to get satisfaction of the project-relevant party (Minimum project management, Guo Zhixing, 2020).

3. Material and method

This chapter is mainly about the introduction of Lenovo Company, as well as the motivation and feasibility behind Lenovo implementing this project. I also introduced the project management tools I will use in the next chapter, here I only list them.

3.1 Short introduction of Lenovo company

MISSION

Smarter technology for all

Through technology to empower each individual and enterprise, realize its own intelligent transformation. In China, we call it "Lenovo Smart China".

Lenovo will provide information technology, tools and services. Make people's lives simple, efficient, and colorful

VISION

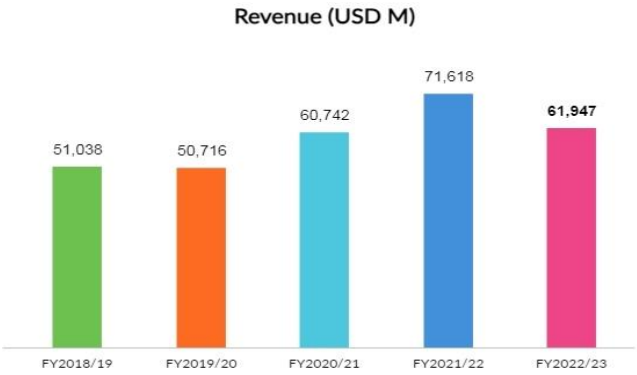
Lenovo provides millions of global customers every year of Integrated the intelligent terminal of technology, service and best experience, especially pc. Also provide powerful cloud infrastructure and intelligent solutions for the entire industry.

Firstly “Lenovo” is a synthetic word. “Le” comes from English “Legend”. “novo” comes from latin language “nova”, which means new. Lenovo is a multinational technology company in China. It was founded in 1984. Lenovo Company mainly develops, produces and sells laptop computer, all-in-one computer, desktop computer and mobile internet, digital, computer related products. Lenovo Company acquired IBM personal computer business in 2005. Since 2011, it has become the world’s second largest personal computer manufacturer. Since 2013, it has become world’s largest personal computer manufacturer. However, as the era of mobile internet and mobile smart devices comes, Lenovo Company also marched into smart phone filed. But just as Samsung and Apple can’t easily enter the personal computer field, the smart phone and tablet business is still not main business of Lenovo company.

Lenovo has about 57,000 employees worldwide, with an annual turnover of more than 47 billion dollar. In the second quarter of 2023, Lenovo’s shipments were 14.2 million units, with a market share of 23.1%, raking first. The second place is HP, with a market share of 21.8%. The current market value of Lenovo Company is about 14.9 billion dollar. Lenovo now is actively developing the market share in emerging market. Table below is about Lenovo Company’s revenue in recent years. **Figure 3** below is about Lenovo’s revenue in recent years

Figure 3: Lenovo Company's revenue 2018-2023

(Source: Lenovo published data, 2023)



3.2 Why Lenovo want to implement new retail store project

SWOT analysis

The four major elements of SWOT analysis are strength, threats, opportunities, and weakness. It can help to comprehensively analyze the internal resources and capabilities of the enterprise, and the purpose is to clarify the position of the enterprise in the market.

Strength: The strength of Lenovo is sufficient cash flow, existing market share, introducing electronic computer research and development technology, power of bargaining with upstream enterprises, lots of market channel.

Opportunity: The major opportunities in the market are increasing use of personal computers, and consumers' income has recovered compared to pandemic duration. The competition of upstream companies is increasing. In China policy Began to tilt to domestic enterprises, and small-medium brands withdrew from the market.

Threat: For Lenovo, the main threats are that the performance of smartphones and tablets is continuously improved. In some functions, they can replace personal computers. Secondly, many big and famous electronic product companies has successfully developed their own brand experience store, for example Apple. Apple experience stores not only integrate online and offline, making everyone in the experience store has good experience in the products, but also are spreading brand culture and introducing apple's all types of products, which will attract more new consumers and maintain loyal customers. And that's why, besides iphone, Apple's other products are known.

Weakness: The weaknesses of Lenovo's current stage are that the share of emerging markets is not great. Emerging markets need a lot of manpower and financial resources to be pioneered. And in the development of smartphones and tablets, Lenovo lacks of core technologies, operating systems are subject to people, and Lenovo also lacks of a unique and mature profit model. At present, in the field of smartphones and tablets, Lenovo plays the role of downstream integrator in the industry/supply chain. **Table 1** below is SWOT matrix that summarize analysis above

Table 1: SWOT analysis

(*Source: own work*)

Strength	**Weakness**
● Sufficient cash flow ● Existing market share ● Introducing electronic computer technology ● Bargaining power with upstream enterprises ● Lots of market channel	● Market share in emerging market is not high ● Lack of core smartphones and tablets technology ● Operating system is subject to people ● Lack of unique and mature profit model ● Only play the role of downstream integrator in the field of smartphones and tablets
Opportunity	**Threat**
● Increasing demand of personal computer ● Consumer's income recovered compared with pandemic days ● The competition of upstream companies is increasing ● In China more and more favorable policies appear ● Except Lenovo, other small and medium computer brands withdrew from the market	● Smartphones and tablets can replace personal computer in some functions ● Many mainstream electronic product company has successfully developed their own brand experience store, like Apple

Conclusion: Lenovo's sufficient cash flow makes it has strong financing and investment capabilities. Lenovo Company has unique and mature technology in the field of personal computer. Policy and law are conducive to Lenovo's operation in China. But lack of market share in emerging markets. It also lacks of experience stores like Apple's, the main sales channels of Lenovo personal computer are still kinds of media-malls and online store.

This project is to build a retail store of Lenovo's own brand in Beijing. In this era of mobile internet, in addition to personal computer, people also always use mobile smart devices, such as smart phone, smart watch, even earphone, these products are emerging markets. Lenovo Company has a dominant place in personal computer field. But Lenovo's market share in those emerging markets is very low. Iphone is Apple Company's most important product. But its other smart devices are also popular although they are not dominant in market. In contrast, Lenovo personal computer is dominant in market, other smart devices of Lenovo are not as popular as Apple's. Building an experience store like Apple's allows more people to understand Lenovo and its all products, not just personal computer, which will help attract new customer and increase market share in emerging markets. So senior management of Lenovo Company want this project.

3.3 Tools used

To successfully implement a project, the tools in project management are essential. These tools or techniques can be divided into quantitative and non-quantitative in nature. In the entire life cycle of the project, different project management tools will be used. These tools/techniques set route for the project.

- Set “project” (Temporary efforts to create unique, new, products, services. Three dimensions of project are result, time, budget).
- Choose proper project manager (A good manager should have human skills and project-related skills. Human skills refer to whether project manager can play leading role in the team, like whether project manager have communication skills, they are analytical or not, and so on. Project-related skills refer to whether he has professional PM knowledge, they can use the PM tools/techniques or not. In addition, the project manager whose technical skills match the project should be chosen. For example, if the project is construction of an office building, the project manager should be good at engineering).
- CBS (A hierarchical tree structure that shows the project function, we can give quantitative requirements, quality requirements, and environmental requirements).
- WBS (Also a hierarchical tree structure, but it decomposes all the work that is needed to complete the project. It decomposes the work to work package that is meaningless to breakdown any further).
- Feasibility studies (Through feasibility studies we can decide the project will be implemented or not. For example, Technical feasibility refers to we have enough resource to implement the project or not, financial feasibility refers to cost and returns, risk assessment focus on the risk that could affect 3 dimensions of project and try to minimize the risk).
- Types of contract (there are traditional type of contract, turnkey type of contract, management type of contract. They allocate risk and responsibility associated with project result and time between client and contributor).
- Forms of payment (there are price based payment, cost based payment, material-time based payment, and target based payment. They allocate the risk and responsibility associated with cost between client and contributor).
- Gantt chart (it is a horizontal bar chart that is used to schedule time, we can know start time and finish time of the project from it. Relationship of project activities are shown in the chart, we can know preceding activities and succeeding activities).
- Resource planning (there are skill matrix, task/responsibility matrix, and activity/resource matrix. Skill matrix and task/responsibility matrix is only for human resource planning, activity/resource matrix is for technique resource planning, material planning and also human resource planning).
- Project control (project control is an information system that help to make decisions during implement the project. It has four steps, setting standard, collecting data, analyze data, correction).
- Stakeholder map (It is a graph that shows the stakeholders’ attitude toward the project. Through calculate the size, we can know how popular or hostile in stakeholder group).

1. Feasibility study, Project marketing, decide project to be implemented (preparation phase)
2. Decide subcontractor, decide type of contract and form of payment (awarding phase)
3. Completing activities of project, Project control (implementation phase)
4. Conclude experience, Use the project result (operating phase)

4. Creating a simplified plan

In this chapter, I created a detail plan for project “Lenovo's retail store construction”. I used the project management tools listed in the previous chapter to create my project plan, so you can better understand the use of those project management tools.

4.1 Feasibility studies

Before the project "Lenovo Retail Store Construction" to be implemented, feasibility studies should be done to increase chance of successful project.

Technical feasibility: Technical feasibility checks whether the project result technically can work. For Lenovo company “project result technically work” means the new retail store can increase the market share and spread the enterprise culture including mission and vision. Look around, now many well-known electronic companies, like Apple, has successfully introduced their various products to consumers through operating their own brand retail store, so their various products have occupied a lot of market share. Secondly Apple retail stores have become a must-visit place/shop for many people, which undoubtedly make more consumers especially teenagers buy Apple’s products. The success of similar projects in other companies proves that building own retail store will technically work.

Environmental impact analysis: Building retail stores does not require strict locations selection like building chemical factories, otherwise it will cause pollution. During the construction process Lenovo Company requires subcontractor to use environmentally friendly and recyclable material. Because of using recyclable material, even if Lenovo Company doesn’t operate this retail store in the future, the pollution in recycling process can be minimized. Lenovo retail store also doesn’t discharge harmful gas and industrial wastewater during operation. So the project “Lenovo retail store construction” is an environmentally friendly project.

Market analysis: After the construction of new retail store is completed, it will add shopping channel choice for Lenovo’s loyal users. Consumers can experience Lenovo’s various products in new retail store. And Lenovo’s new personal store also provides personal customized service. Lenovo’s new retail store means to provide consumers with better service. Therefore, we need to do market analysis to the project. Firstly Lenovo’s products have been recognized by consumers globally, and the pandemic period has gone. The people in the mall have become more than pandemic days, people want to go out. Secondly, in terms of price, Lenovo chose the strategy of the same price of online stores and offline retail stores, which will increase the willingness of consumers to shop in retail stores. So Lenovo’s new retail store will be accepted by the market.

Financial feasibility analysis: As a personal computer market share NO 1, the internationalized enterprise with a market value of more than 10 billion US dollars plans to build a retail store with the same level as

Apple retail stores, so it requires large-size and exquisite decoration. Constructing a 300 -square -meter retail store located in Beijing commercial center is now expected to invest 2 million US dollars. According to Lenovo's $ 70 billion revenue from 2021 to 2022, it is feasible to invest in 2 million US dollars. According to the previous operating data, after construction the new Lenovo retail store will double the number of passenger flow, and the sales will be tripled. Especially in addition to personal computers, the sales of other products of Lenovo will get breakthrough increase. So it is financially feasible.

Risk assessment: The three dimensions of the project are time, budget, result. Risk assessment exists in preparations before the implementation of any project. The risk in terms of time is whether the results can be delivered on time. During the pandemic period, many projects have been delayed due to the regulations of home work, but now the pandemic is over, so the risk in terms of time is small. In terms of results, Lenovo has successfully got delivered new retail stores in other cities in China, Lenovo can copy already decided and successful design and capability requirement, so risk is also small. Because the price of materials occupies 70% of the total cost of the implementation phase, the main risk of the project “Lenovo retail store construction” is whether can make the total cost not exceed the budget. To deduce risk we can make selection and dosage of material clear in contract and do earned value-based process control well, change the implementation plan when cost overrun.

Sustainable feasibility study: For the project "Lenovo Retail Store Construction", the successful completion of construction only means that the project is half successful. The key is whether the delivered retail stores can run smoothly as Lenovo's senior management expected. So sustainability study is necessary. In terms of technical sustain, the logistics in the Beijing commercial district is developed, and there is no power supply interruption during the whole year. There are many high education graduates including sales staff in Beijing, so all positions in the new retail stores can find the right candidate.
In terms of financial sustainability, lots of people flow is Beijing's commercial district, so it has enough potential consumers there. According to the operating data of Lenovo's retail store in other city, new retail store can double sales, so it can be profitable and meanwhile pay for employee salary, rent fee and other costs, so retail store can operate for a long time.

Geographic location analysis: The place in the project "Lenovo Retail Store construction" is Beijing. Since the new Lenovo retail store is a new facility, before decide construction location is Beijing the feasibility analysis of Beijing's geographic location needs to be performed. The purpose of Lenovo's senior people planning to construct new retail stores is to increase sales, promote corporate culture, and make brand more knowing. In order to increase sales, the construction location requires enough consumers. Beijing is the capital of China, and residents there generally have higher income compared to other regions. The Beijing commercial center is also a shopping center. To promote corporate culture and make brand more knowing, the construction location must be international at the same time. Many international students study in Beijing, and many foreigners travel to Beijing. The Beijing commercial center is the location of many foreign

companies, and many foreigners will work there for short or long-term. Therefore, the Beijing commercial center is an ideal place for the construction of new Lenovo retail store.

Stakeholder analysis: Any project, regardless of the project type, requires stakeholder analysis before implementation. Customers, owners of Lenovo, and the government are all stakeholders. Customers and government are external stakeholders, and the owners of Lenovo are internal stakeholder. Owners of Lenovo want to increase market share and expand brand influence. Many world-class companies have already begun to run their own brand retail stores and have got good results. Few new retail stores that Lenovo has put into operation in other cities have also successfully increased sales. Therefore, owners of Lenovo have no reason not to support another construction of new retail stores. New retail stores are also good news for consumers. Because, in addition to work, people mainly go to the Beijing commercial center to shop. They can experience Lenovo's various products in the new retail store, and they can choose multiple ways of payment. If retail stores are successfully put into operation on schedule, it will provide local people opportunities for job. Secondly, since it will increase the sales of Lenovo, the government can benefit from taxing. High-quality retail stores can increase the people flow in the commercial center, which is conducive to the development of the commercial center. Therefore, the government can also benefit from this project.

4.2 Identify the most feasible project idea

In fact, there will be multiple projects idea alternatives before the project is determined to be implemented, and the most feasible one will be selected after the analysis and calculation through the scoring point system. For example, the project to be implemented in this thesis is "Lenovo Retail Store Construction". We call it project idea C, and meanwhile also exists the project idea A, B, D. Then the project idea C gets the highest score in the scoring system. **Table 2** below is scoring point system about project idea C.

4.3 Creating CBS

After feasibility analysis, the project marketing, the project "Lenovo Retail Store Construction" was determined to be implemented. Later, Lenovo should first think the capabilities that the coming retail stores should have. These capabilities include functional capability and non-functional capability. That is to create CBS (capability breakdown structure). In the process of creating it, Lenovo Company plans capabilities, not action.

CBS:

Level 1: Lenovo retail store

Level 2: payment and transaction, private customization service, communication and experience, product display, express the image of the company

Level 3: [making invoice, safe storage of cash, picking up goods, ordering goods online]. [computer appearance printing, computer appearance carving, hardware customization]. [product introduction, experience products, Lenovo users communicate]. [displaying Lenovo computer, displaying other brand's products empowering by Lenovo's technology, displaying Lenovo's various mobile smart products, displaying Lenovo top technology concept products].
(As shown in **figure 4**)

Table 2: Scoring point system
(*Source: own work*)

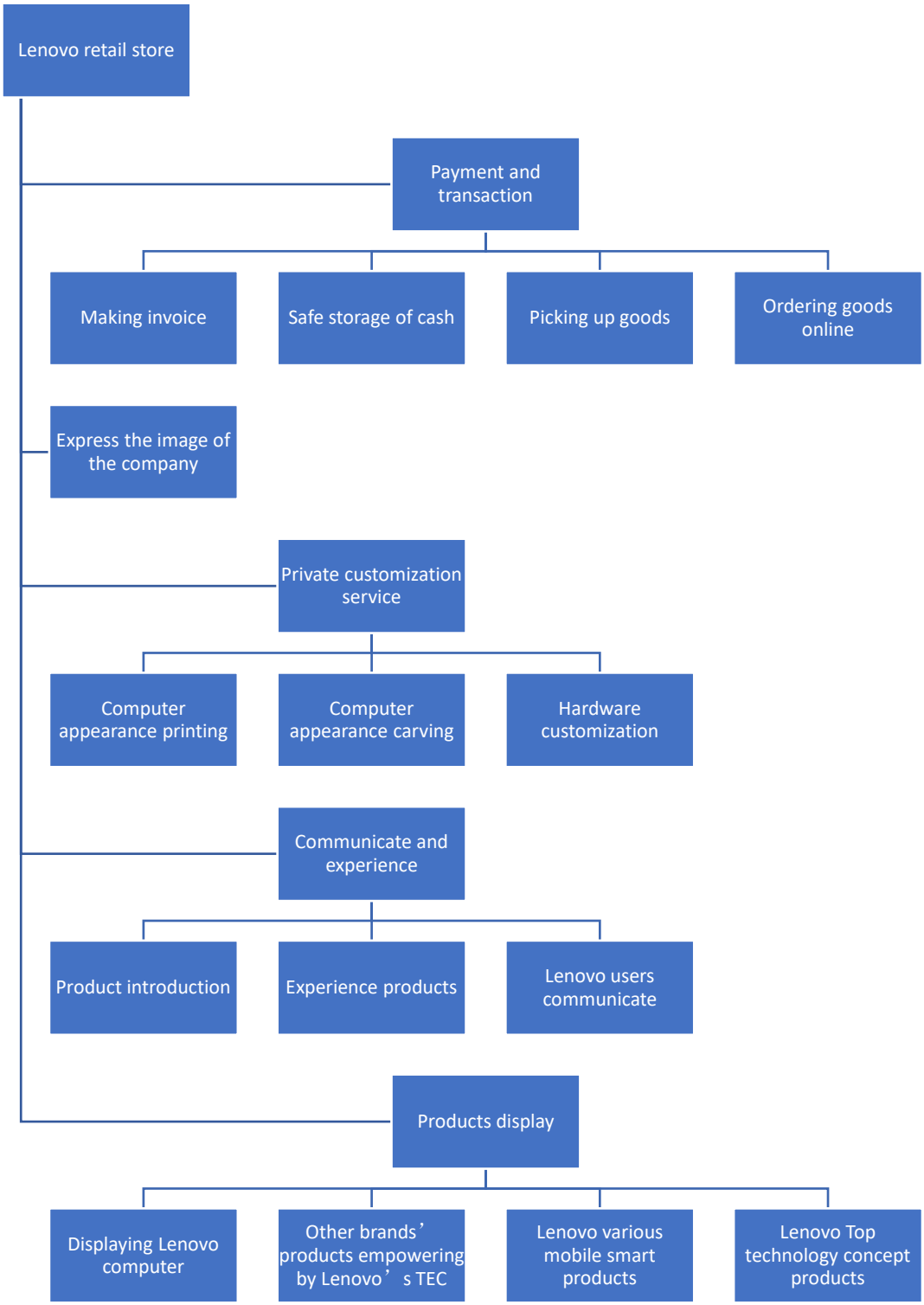
Project ideas	**A**	**B**	**C**	**D**
Technical feasibility	3	3	5	4
Environmental impact analysis	2	5	4	5
Market study	1	2	3	2
Financial feasibility	5	3	2	2
Risk assessment	3	3	3	3
Sustainable feasibility	3	2	4	2
Geographic location	3	1	4	2
Stakeholders	4	2	3	2
Total score	24	21	28	22

4.4 Choose type of contract

CBS is the prototype of the result of Lenovo's planned retail store. After the CBS is completed, Lenovo should think about how to build the expected retail stores. Lenovo is a personal computer manufacturer, not a construction company. Therefore, Lenovo must bid the project if they want retail store to be successfully built, and then sign a contract with the selected construction company. At this time, the project enters the second stage of the project life cycle, awarding phase. Lenovo needs the project implementation strategy to allocate risks and responsibilities between it and construction company. When allocating risks and responsibilities, Lenovo Company need to analysis the environment.

Figure 4: **CBS** (capability breakdown structure):

(*source: own work*)



There are traditional type of contract, turnkey type of contract, management type of contract. In this thesis the client is Lenovo Company. Which type of contract should Lenovo choose to sign? The type of contract is about allocation of the responsibility and risk related to project result and construction time.

Traditional type of contract: Most risks and responsibilities are shifted onto client. Client signed multiple contracts with different sub-contractors. The client is responsible for the project results and project implementation duration. The advantage is that client can control the project implementation process and can flexibly change the plan during the project implementation. The disadvantage is that the information flow is not efficient.

Turnkey type of contract: Most risks and responsibilities are shifted onto the contributors/turnkey contractor, and client only sign one contract with the turnkey contractor. Even if the turnkey contractor sign contracts with sub-contractors, he is responsible for the project result and project implementation duration. The advantage is that the information flow is efficient. The disadvantage is that the client cannot make change during the project implementation process, and lose the control over the project implementation process.

Management type of contract: Risk and responsibility are shared by two stakeholders, and the management type of contract has all the advantages of traditional type and turnkey type of contracts. One management contractor signs contracts with the sub-contractor in the name of client. Management contractor is responsible for good project management. The advantage is that client can choose the appropriate subcontractor and can make changes during the project implementation process. The information flow in the management type contract is more efficient than traditional type of contract's, less effective than turnkey type of contract's.

Lenovo has high requirements for the project result. They want that the entire retail stores will look beautiful and all equipment can coordinately work, especially internet and data equipment, because Lenovo's new retail stores will provide a large number of customized services. At the same time, retail stores must be delivered on time. Inefficient information flow in the traditional type of contract may lead to longer construction time, and the require client has a lot of project management competence, but Lenovo is a computer manufacturer, not a construction company, and no retail store construction experience and ability. Constructing new retail stores is far more complicated than decorating ordinary apartments. Therefore, the traditional type contract is not considered as a choice.

Neither turnkey type of contract nor management type of contract require client to have much project management competence. The turnkey type of contract doesn't allow to make change during the construction of retail stores, but Lenovo company want the new retail stores and Apple's are same level, Lenovo company may request replacement of dissatisfaction during the construction process, such as glass, lights, and network equipment. So Lenovo Company chooses the management type of contract.

4.5 Choose the form of payment

The project implementation strategy includes not only choose the type of contract, but also the form of payment. The form of payment is generally written on the contract. The form of payment is about allocation of responsibilities and risks related to implementation cost. Now exits price-based form of payment, cost-based form of payment, time and material form of payment, and target-based form of payment.

Price-based form of payment: Most risks and responsibilities are shifted onto the contractor. Regardless of the actual cost of the contractor, the customer only pays a fixed cost. If the actual cost is lower than the calculation before, the contractor will get higher profits. If the actual cost is higher than the calculation before, the contractor gets lower profits. The advantage is that client can easily make budget. The disadvantage is that it is not flexible and it is not easy to change the work package. The contractor will only agree when the client gives a higher price.

Cost-based form of payment: Most risks and responsibilities are shifted onto client. There are two ways generally, one is the cost plus fixed fee, and the other is the cost plus percentage. The advantage is that client can easily make changes, do not need to know the accurate way of implementation at beginning. Client also does not have to be afraid of over-price. The disadvantage is that this form of payment requires time and expenses to do continuous cost management. Because the final cost is unknown, it is difficult for client to make budgets.

Time and material form payment: Time and material form of payment is also a cost-based form of payment. It is mainly used in IT projects. Client pays for hardware and software (materials) and IT engineers' working time.

Target-based form of payment: Risks and responsibilities are shared by client and contractor. In this form of payment, the final cost depends on the completion of the project goal, that is, the expense target, the time target, the parameter target. If the goal is completed, the maximal fee is paid. If the goal is not achieved, the reduced fee is paid. The advantage is that it promotes the better work of the contractor. The disadvantage is that client needs to do a lot of management and calculations, such as the accurate definition of goal completion, the calculation of the award fee and punishment fee.

First of all, time and material form of payment doesn't need to be considered, because the project "Lenovo Retail store construction" is not an IT project. Since the price of raw material is currently stable in China, there is not much fluctuations in the current price, so the price-based payment method is feasible for contractors, but it is not flexible and it is not easy to make changes. Lenovo Company is very likely to make changes to the work package during the construction of retail stores, so they don't choose price-based form of payment. The cost-based form of payment allows client to make changes. And the price of raw materials in China is stable, which reduces the risks of Lenovo Company, so it is a choice. The most important thing

for Lenovo company is that the quality of the retail stores and delivery on time. The target-based form of payment can encourage the contractor to work hard to reach the indicator required by Lenovo, so compared with the cost-based form of payment Lenovo Company will eventually choose target-based form of payment.

4.6 Creating WBS

After bidding and choosing contractor, it is to create WBS. Understanding project goals and creating WBS are the most important tasks in the whole project life cycle. If we cannot create the right WBS, the following work is a waste of time. In the process of CBS to WBS, we plan the outcomes, not action. For example, the elements in WBS can be a product, a service, a set of data, or the combination of them.

WBS:

Level 1: Lenovo retail store

Level 2: Building engineering works, design works, employee recruitment, finishing works

Level 3: [internet equipment installation, electric network installation, heating system installation]. [counter installation, displaying table installation, floor covering, wall painting].

(As shown in **Figure 5**)

4.7 Time planning

4.7.1 Identify the interrelationship between activities

There are 6 steps in the time planning. The first step is to identify project activities. What activities need to be completed in order to create the project result. The second step is to identify the interrelationship among the project activities and set the chronological order of the activities. The third step is to determine the duration time of each activity. The fourth step is to use a chart to visualize the entire time plan. The fifth step is to analyze the time plan. The sixth step is to optimize the time plan and try to shorten the duration of the entire project.

From WBS, we can identify project activities. All activities at the lowest level are work package that can be measured and outsourced. After that, we need to identify the interrelationships between activities. For example, in terms of a certain activity, we need to think about what to be completed before this activity (preceding activity) and what we can start after this activity (succeeding activity). Besides, we also need to identify overlapping and waiting time between activities, and activities that can be carried out together at the same time (parallel activity). **Table 3** below is about interrelationships between activities of project “Lenovo retail store construction”.

Figure 5: **WBS**(work breakdown structure):

(*source: own work*)

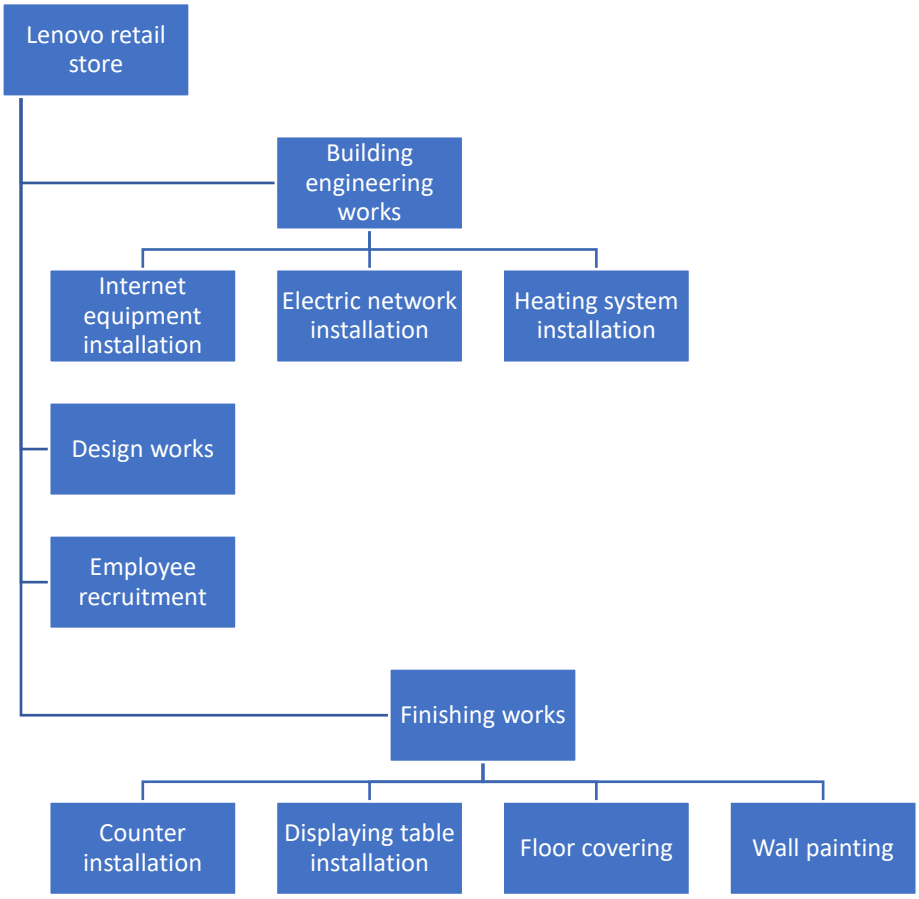


Table 3: Precedence table

(*Source: own work*)

No	Activity	preceding	Wait/overlap
1	Design works		
2	Internet equipment installation	1	
3	Electric network installation	1	
4	Heating system installation	1	
5	Floor covering	2,3,4	
6	Wall painting	5	+1
7	Counter installation	5	
8	Displaying table installation	5	
9	Recruit staff	7,8	

4.7.2 Identify the duration time of each activity

Now we need to identify the duration time of each activity, generally there are three ways. The first is based on the experience of previous projects, and the second is to use references of activities of similar projects in the industry (industrial norms). The third is that the project team estimates the time. **Table 4** is about duration of each activity in project "Lenovo retail store construction".

Table 4: Preceding table with duration

(*Source: own work*)

No	Activity	Duration	Human resource
1	Design works	1	1
2	Internet equipment installation	1	2
3	Electric network installation	1	2
4	Heating system installation	2	2
5	Floor covering	2	1
6	Wall painting	2	1
7	Counter installation	1	2
8	Displaying table installation	1	2
9	Recruit staff	1	3

4.7.3 Visualize the time plan

After deciding the duration of each activity we need to draw a graph, that is visualizing the time plan, so that we can see the entire process of the project. The Gantt chart is a horizontal bar chart that can display the time relationship of project activities. It is named after American engineer Henry Gantt and applied firstly. From the Gantt chart, we can know the total time of the project, the order of the activity, and the parallel activities. **Figure 6** is to visualize time plan of project "Lenovo retail store construction".

In addition to the Gantt table, the other commonly used method to visualize the time plan is the network diagram. The network diagram is a diagram composed of nodes connected by the directional arrow. There are two types of network diagrams, one is AOA (activity on arrow), and the other is AON (activity on node). When the activity is represented by the node, the arrow expresses the dependence between activities. When the activity is represented by the arrow, the node represents an event. The difference between activities and events is that activities are the tasks required by the project, consuming resources and time, as shown in WBS. Event is a state that can be identified after the activity is completed, and does not consume resources and time. **Figure 7** is "activity on node" about project "Lenovo retail store construction".

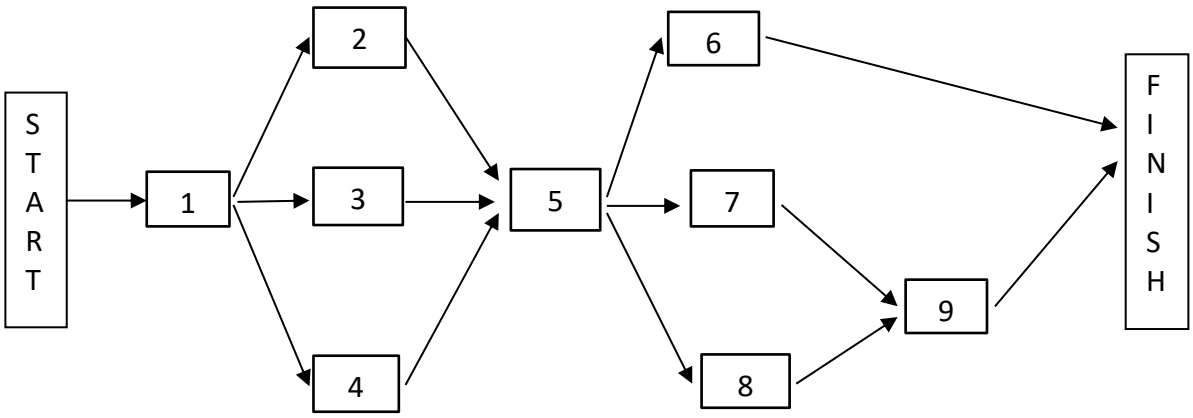
Figure 6: Gantt chart (month)

(*Source: own work*)

sign	Step	1	2	3	4	5	6	7	8
1	Design works								
2	Internet equipment installation								
3	Electric network installation								
4	Heating system installation								
5	Floor covering								
6	Wall painting								
7	Counter installation								
8	Displaying table installation								
9	Recruit staff								

Figure 7: AON

(*Source: own work*)



4.7.4 Analyze the time plan

Now the time planning enters the fifth step, that is analyzing the time plan. CPM (critical path method) is a commonly used tool for analyzing time plan. It uses the deterministic estimate of activity duration, the purpose is to find critical activities that cannot be delayed (activities on critical path). Through CPM, we could find critical path, the duration of entire project, slack time. The critical path is a series of activities connected by arrows from the beginning to the end, there is no slack time on this path. If critical activities are delayed, the delivery of the project result will be delayed.

According to preceding table with duration and AON we can list all the paths and the duration of them.

Start-1-2-5-6-finish, 6 months

Start-1-3-5-6-finish, 6 months

Start-1-4-5-6-finish, 7 months

Start-1-2-5-7-9-finish, 7 months

Start-1-3-5-7-9-finish, 6 months

Start-1-4-5-7-9-finish, 6 months

Start-1-2-5-8-9-finish, 6 months

Start-1-3-5-8-9-finish, 6 months

Start-1-4-5-8-9-finish, 8 months

Now we can see that the path "Start-1-4-5-8-9-finish" takes 8 months, the longest time in all paths, so it is the critical path. All activities on this path are critical activities, if any activity on this path is delayed, the delivery of the project result will be delayed. So, we need to allocate enough resources to critical activities. 8 months is also the duration of the entire project and critical time.

4.7.5 Calculate the slack time

The amount of time that Non-critical activities can be delayed without delaying delivery of projects is called slack time or float time. Other activities on non-critical paths are non-critical activities. Slack time = LF(Latest finish time)-EF(Earliest finish time) = LS(Latest start time)-ES(Earliest start time). There is no free time in critical activities, because for them LST-EST = LFT-EFT = 0. By forward pass method EST and EFT can be found in all activities. For example, for the first activity, its EST is Day 0, and its EFT is its duration. The second activity cannot start before the first activity is completed. The first activity's EFT is the second activity's EST. Through the backward pass method, we can recognize all LFT and LST. For example, the LFT of the last activity is critical time, that is 8 months, its LST = critical time-duration. Last activity's preceding activity must end before it starts, Its LST is the LFT of its preceding activity. **Figure 8** is AON with critical path of project "Lenovo retail store construction"

One AON node:

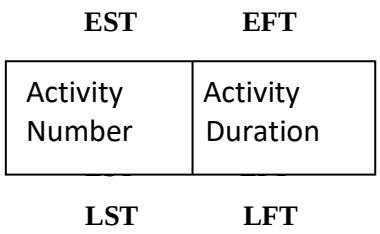
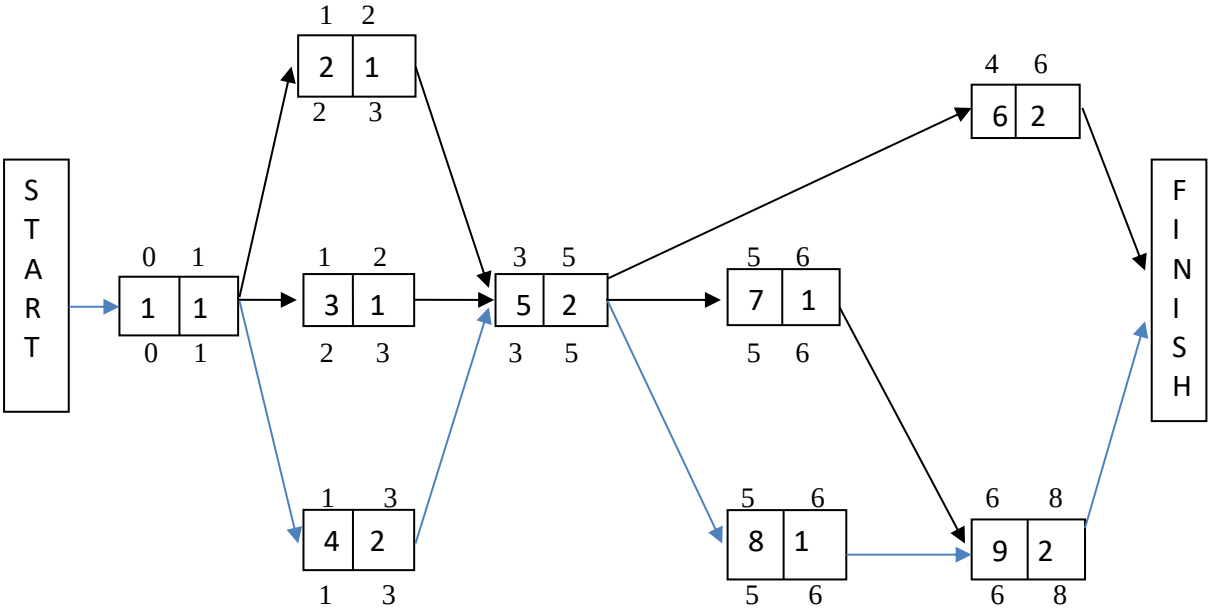


Figure 8: AON with critical path

(*Source: own work*)



Now we integrate all the numbers in the AON into a table and then calculate the slack time. Slack time=LST-EST=LFT-EFT

Table 5 is to show calculation of slack time.

Table 5: Slack time

(*source: own work*)

Activity number	Activity duration	EST	EFT	LST	LFT	Slack time
1	1	0	1	0	1	0
2	1	1	2	2	3	1
3	1	1	2	2	3	1
4	2	1	3	1	3	0
5	2	3	5	3	5	0
6	2(+1)	4	6	6	8	2
7	1	5	6	5	6	0
8	1	5	6	5	6	0
9	2	6	8	6	8	0

Figure 9 is to visualize slack time, critcal path, non-critical in Gantt-chart.

Figure 9: Action plan (month)

(*source: own work*)

sign	Step	1	2	3	4	5	6	7	8
1	Design works								
2	Internet equipment installation								
3	Electric network installation								
4	Heating system installation								
5	Floor covering								
6	Wall painting								
7	Counter installation								
8	Displaying table installation								
9	Recruit staff								

Non-critical path critical path slack time

4.8 Cost table

We chose target-based form of payment method, so we track the progress of the project, check the results of each work stage, determine whether reward the work of each stage and then pay the fee at the end of every stage. Cost of each the stage put together is total cost of project. **Table 6** is about budget of project "Lenovo retail store construction"

Table 6: Budget

(*Source: own work*)

Design works	150000$
Internet equipment installation	350000$
Electric network installation	300000$
Heating system installation	300000$
Floor covering	150000$
Wall painting	150000$
Counter installation	100000$
Displaying table installation	100000$
Recruit staff	70000$
Total cost	1570000$

4.9 Human resource chart

In project “Lenovo retail store construction” There is a group of people from different profession perform different tasks, such as architect responsible for retail store design, different technical workers that install network equipment and heating systems, craftsman doing floor covering. One of the ways to track project activities and the project team member’s work is to create a human resources plan. When we create it, we establish some charts. One of the basic simple charts is human resource chart. It is a bar chart as same as the Gantt chart, but vertically. In the human resource chart, on the left side is the amount of human resources required, and on the top is the time interval. In **Figure 10**, we add human resource each activity needs to Gantt-chart firstly, and draw human resource chart of project “Lenovo retail store construction” in accordance with time interval of Gantt-chart

Figure 10: Human resource chart

(*Source: own work*)

*Human resource (month)

Activity number	Step	1	2	3	4	5	6	7	8
1	Design works			1*					
2	Internet equipment installation				2*				
3	Electric network installation				2*				
4	Heating system installation					2*			
5	Floor covering							1*	
6	Wall painting								1*
7	Counter installation								2*
8	Displaying table installation								2*
9	Recruit staff					3*			

month	1	2	3	4	5	6	7	8
Human resource								
8								
7								
6		●						
5		●				●		
4		●				●		
3		●				●	●	●
2		●	●		●	●	●	●
1	●	●	●	●	●	●	●	●

4.10 Project control

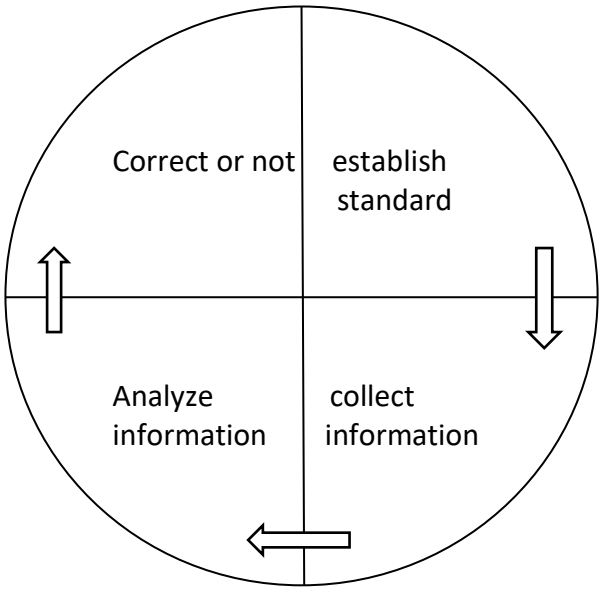
4.10.1 Process of project control

Now the project "Lenovo Retail Store Construction" enters the third stage of the project life cycle, that is the project implementation stage. In the earlier stages of the project life cycle, we have developed a detailed plan, which will play a vital role in tracking project progress in the third stage. There are two main tasks in the third stage, one is to complete the project activities, and the other is project control. Because project can be regarded as success only when Lenovo Retail stores can start run on time and without exceeding the budget, project control is particularly.

Project control is an information system that helps us make correct decisions in the project implementation stage. There are two types of project control, one is scope (result) control, and the other is process control. Scope (result) control focuses on the project result, and process control focuses on the project implementation process. The general steps of the project control are the first is to establish standards; the second is to observe performance and collect information; the third is to analyze the information and compare the collected information with the standards established; the fourth is to make decisions, correct or not. The frequency of collecting information is generally checking short time critical activities every day, checking all critical activities and the non -critical activities that consume resources every week, and checking all project activities every month. **Figure 11** shows 4 processes in project control and their direction.

Figure 11: Process of Project control

(*Source: own work*)



4.10.2 EARNED VALUE-BASED PROCESS CONTROL

EARNED VALUE-BASED PROCESS CONTROL is a process control. It can reflect whether the progress of the project is according to schedule, and whether the cost is according to budget. There are two requirements to track the project with EARNED VALUE-BASED PROCESS CONTROL. The first is that already exits project time plan (schedule). The second is that already exits activity-based cost estimation, and activities are in accordance with time schedule. There are some important data or measurement in this process control, they are BCWS (budget cost of work scheduled), BCWP (budget cost of work performed), ACWP (actual cost of work performed), SV (schedule variance), SPI (schedule performance index), CV (cost variance), CPI (cost performance index). **Table 7** is about earned value-based process control's rule.

Table 7: Earned value-based process control's rule

(*Source: own work*)

SV=BCWS-BCWP

SV>0	Behind the schedule
SV=0	According to schedule
SV<0	Ahead of schedule

SPI=BCWP/BCWS

SPI<1	Behind the schedule
SPI=1	According to schedule
SPI>1	Ahead of schedule

CV=ACWP-BCWP

CV>0	Cost overrun
CV=0	According to budget
CV<0	Cost saving

CPI=BCWP/ACWP

CPI<1	Cost overrun
CPI=1	According to budget
CPI>1	Cost saving

In terms of the project "Lenovo Retail Store Construction", we have made the Gantt chart, we have also made a budget table. Therefore, the time plan(schedule) has already existed, and the activity-based cost estimate has also existed, which meets two requirements of using earned value based-process control to track the project. Then we can check whether the activities are according to schedule and whether the cost is according to budget during the implementation of the retail store project.

For example, according to the Gantt chart after three months of implementation of the project, the heating system installation has been completed. According to the budget table, Lenovo company should already spend 1100,000 $. Design works fee + internet equipment installation fee + electric installation fee + heating system installation fee: 150000$ + 350000$ + 300000$ + 300000$=1100000$. So 1100,000 $ is the budget cost of work scheduled (BCWS). So according to earned value-based process control's rule above, we have **table 8.**

Table 8: Earned value process control of project "Lenovo retail store construction"

(*Source: own work*)

SV=1100000$-BCWP

SV>0	Behind the schedule
SV=0	According to schedule
SV<0	Ahead of schedule

SPI=BCWP/1100000$

SPI<1	Behind the schedule
SPI=1	According to schedule
SPI>1	Ahead of schedule

If at the end of the third month of the project implementation, the heating system installation, electric network installation and the internet equipment installation are completed, then the budget of work performed is 1100,000 $. Then we have:

CV=ACWP-1100000$

CV>0	Cost overrun
CV=0	According to budget
CV<0	Cost saving

CPI=1100000$/ACWP

CPI<1	Cost overrun
CPI=1	According to budget
CPI>1	Cost saving

5. Conclusion

After the exploration of the previous chapters, in this chapter I look forward to the role played by Lenovo's own retail store, expressing the views of the future business development of Lenovo Company and the personal feelings after writing this paper.

5.1 Suggestions to Lenovo Company

Now Lenovo's personal computer business is already number one in quality and market share. Even if it has become a successful international company, Lenovo still has some shortcomings. So at the end of the paper, I want to make some suggestions to Lenovo Company.

First of all, Lenovo should improve after-sales service. Before Lenovo start its own retail store project, Lenovo products' sale channels were mainly online stores and offline media markets. After payment online, it often takes a long time to receive products. If purchases Lenovo's products at offline media market, it is difficult for the media market to repair it when the product is out of order, because of lack of special components produced by Lenovo. Lenovo's own retail store provides a variety of transaction methods and maintenance services for products, so I hope that the project "Lenovo Retail Store Construction" can improve Lenovo's after-sales service.

Based on the SWOT analysis at the previous chapter, my second suggestion to Lenovo is about finding a new business breakthrough point in addition to personal computers. In the Apple experience store, there are other products of Apple's own brand in addition to the iPhone, and they are popular. In contrast, Lenovo's other products except personal computers are not very known. When Lenovo's own retail stores are completed, there should be other Lenovo products in the retail store in addition to personal computer. Therefore, Lenovo should put more resources on research and development in new fields and new products to find new business breakthrough points. Lenovo begun to invest on AI servers years ago and has achieved some results. Lenovo should display the developed AI server in its own retail stores and introduce it, which can improve the market share of Lenovo's AI server and spread enterprise culture.

5.2 Gain of writing the thesis

Since online shopping has entered people's life, the traditional retail industry has been challenged. Although it is challenged why the world's top enterprise/brands still invest a lot of resources to build their own retail stores? This has always been a question that makes me doubt and interested, but I never think too much. This time writing the thesis gives me an opportunity to spend time exploring and thinking about the development trend of the retail industry.

No matter which industry, which company, from planning travel to build rockets, only good project management can increase the success rate of the project. Writing the thesis allows me to use project management tools to create the entire project plan. This is not only an interesting thing, but also let me deeply understand project management is useful.

6. Summary

From the title "Simplified Project Plan of Lenovo Retail Store construction", it is not difficult for you to see that the focus point of the thesis is project planning, followed by the name of the project "Lenovo Retail Store Construction". From organizing birthday party to building rockets are all projects. By writing this thesis, my first main objective is to learn to use basic project management tools to plan projects.

The Internet has entered our life for a long time since the 20th century. All industries, including the retail industry, now produce a lot of data every day. These data may be garbage or valuable. O2O is very popular today, how is project feasibility of Lenovo Company's offline retail store plan? My secondary goal from writing this thesis is to see the development trend of the retail industry.

The result is one of the three dimensions of a project. In terms of the result, I summarized the functions of Lenovo Retail Store in reality, and then briefly introduced them in Chapter 1 "Introduction". Through reading those functions you will have an overall image of the finish-built retail store. In the first chapter, you can also learn more about my goals and motivations of writing this thesis.

In the case of online shopping is very popular today, why does Lenovo Company invested a lot of resources to implement offline retail store project? I used the SWOT matrix to explore this problem in Chapter 3 "Material and method". Since from the organizing birthday party to building rockets are all projects. The reason why I do not choose building a rocket as a project and choose building a retail store is because it is important to choose appropriate project manager for different projects. The project manager needs to have professional knowledge related to the project, you can read more details about this in Chapter 3. I briefly introduced Lenovo. If Lenovo is an unfamiliar company for you, you can roughly understand the nature of this company including Mission and Vision.

In order to achieve the function of retail store, what project activities need to be done? How to optimize the project time schdule? what is the budget scope for project "Lenovo reatil store construction"? How to allocate human resources according to the project time schdule? etc. In Chapter 4 "Creating a simplified plan", I use basic project management tools to create a detail project plan for "Lenovo Retail Store Construction", including the feasibility analysis of the project, creating CBS, WBS, formulating timetables, etc. The project management tools are only listed in the Chapter 3. In Chapter 4 the tools listed will be used in order according to their position in the project life cycle. All the dimensions of project budget, time, and result will be presented in detail plan in this chapter.

Since I created the simplified project plan for building Lenovo Retail Store and analyzed Lenovo Company's internal and external environment, in Chapter 5 "Conclusion" I looked forward to the finish-built retail stores to improve Lenovo Company's after-sales service, and personally suggest Lenovo Company Finds a new business breakthrough point besides personal computer (PC). At the same time, it also expresses my gain of writing this thesis.

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