中国民航大学

Project Management Dossier

BONGOLA REPUBLIC

Eye-in-the-Sky Project

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0 Project introduction

0.1 Project background introduction

After many years of civil war, the tribal factions of BONGOLA Republic have finally signed a truce and have formed a joint government. They are now addressing the terrible state of the economy and are looking to fund a rebuilding program through foreign earnings through tourism. They have identified a worldwide interest in safari and to service this demand they have set aside vast tracts of the country as Game Reserves.

A number of support programs have been identified and submitted to the leading industrial nations for financing under the aid proposals that led to the cessation of hostilities. The first program (Eye-in-the-Sky) addresses the three most critical aspects identified for success. These are:

- Increase Security (to ensure the security of visitors and for game wardens)
- Reduce Poaching (braconnage) (to increase the number of animals and to ensure that they are less hostile to man)
- Finding Game (to ensure that visitors have the opportunity to observe game and to have a rewarding holiday experience)

The Tourism Minister considers that aspects of these critical areas can be addressed through common means. They all need transport that can cover huge areas and that can report back to base staff. It is anticipated that some form of aerial transport, like light Aircraft, Balloon or UAV (Unmanned Aerial Vehicle), with a simple air-to-ground communication system, will offer a cost-effective Eye-in-the-Sky facility. The Tourism Minister has little interest in technology and is unimpressed with technical specifications. He is looking for a specific capability that can deliver adequate performance at an affordable cost.

Most of the staff employed to manage and work in the Game Reserves are better educated than the rest of the population. They are mostly retired police officers or retired military personnel up to officer level. They are experienced in working in the bush and most have some appreciation of military equipment. They all report to the Ministry of Interior. Despite their high capabilities they do not have a common level of education and they are not trained to the same standard. BONGOLA did not have an Air Force and so none of its people are trained to fly.

Due to the wars, the central bureaucracy is weak and government staff is unskilled in sophisticated procurement. To help offset this shortcoming, and on the insistence of the

governments providing the funding, external consultants have been hired. These consultants are experienced in complex procurement and will guide the government departments in the conduct of the procurement process. They will co-ordinate the specification, bidding and selection activities. To ensure impartiality they report to the Interior Minister and not to the Tourism Minister.

0.2 Objective

BONGOLA Republic plans to purchase a number of air vehicles to be used in remote field locations to monitor the status of up to 5 Game Reserves that are under the control of the Minister of the Interior. Successful bidders must manufacture and provide these air vehicles, develop and provide a training program for BONGOLA personnel and regional maintenance personnel, and provide continuing maintenance support and inspection support throughout the life of the system.

The ultra-light aircraft is an expensive option but is consider as a good solution in terms of ease of flying and resilience to failure. It has greater payload than the UAV but less than the balloon. If there is a loss of thrust the ultra-light can be flown as a glider for some considerable distance.

Our company can produce an aircraft named AD200 which can meet the requirement of this project. Besides, we can provide a training program for BONGOLA personnel and regional maintenance personnel, and provide continuing maintenance support and inspection support throughout the life of the system.

0.3 Milestone

1. Acquisition of approval and certificate of the AD200
2. Accomplish the joint design of AD200 operation management system.
3. Successful of the construction of the base stations.
4. Successful of the training.

0.4 Stakeholders

The project is an important project of our company Parisair company, although we have occupied 60% market of Bongola, this project is at a critical period of development, so we will try our best to do it. Not only to ensure the reliability of manufacturing, we

will also provide the best training of pilots and maintenance, of course the inspection throughout the life of the system. Then, the government of Bongola has the regulatory authorities for deciding whether accept our production and some policy support. And the residents of Bongola are our expected some of them can be our pilots and workers in the future. Energy supplier is also an important stakeholder for providing fuel. Finally, the consultant play an important role for purchase and convince the Minister of Interior and the Minister of Tourism.

Table 0-1 represents the five more important stakeholders and the relationship between them.

	Stakeholders	Relationship
1	Parisair company	Our company
2	Government of Bongola.	Customer & Regulatory authorities
3	Residents of Bongola	Pilots and Workers
4	Energy supplier	Fuel
5	Consultant	Purchase & Assist the government

1 Customer Issues

From Chapter 1 to 3 above, define about 5 to 7 Customer issues; prioritize and weight them, so the total weight is 100 %.

Make a summary as table1-1, with the Customer issues in priority order, and with their weight.

Table1-1 Summary of the the Customer issues

Issues	Customer Weighting
Price	20%
Coverage range	18%
Be easily maintainable	17%
Safety	15%
Contribution to the development of economy	10%
Being piloted by personnel who receive flight training	10%
Easily transportable	10%
TOTAL:	100%

For the customer issues, we think there are 7 issues: price, coverage range, be easily maintainable, safety, contribution to the development of economy, being piloted by

personal who receive flight training, and easily transportable.

As for the weight, we think the price is the most important because the budget of the government is very limited. And the coverage range is also so important because the aim of this tool is to cover all the area. And be easily maintainable mainly due to control the latter part of the operation and maintenance costs point of view. In addition, safety is also important for aviation activities

2 Strengths & Weaknesses

2.1 Strengths and Weaknesses through 3 options

1) The analysis of strengths and weaknesses for balloon-based system as table 2-1.

Table 2-1 Strengths and Weaknesses of balloon-based system

Strengths	Weaknesses
Cheapest	Requires a four-man team to get it airborne
Rise from a small clearing	Requires petroleum gas
Carry additional weight	More susceptible to wind and adverse weather conditions
	More susceptible to fully loaded
	Difficult to maneuver when landing
	Needs a large open space
	Maintenance requirements for a balloon are very high

2) The analysis of strengths and weaknesses for ultra-light aircraft as table 2-2.

Table 2-2 Strengths and Weaknesses of ultra-light aircraft

Strengths	Weaknesses
Far less susceptible to wind	Requires a strip of clear land
Carry additional weight	More expensive
A good solution in terms of ease of flying	Less payload than the balloon
Resilience to failure	
Greater payload than the UAV	
It can be flown as a glider for some considerable distance	

3) The analysis of strengths and weaknesses for UAV as table 2-3.

Table 2-3 Strengths and Weaknesses of UAV

Strengths	Weaknesses
Consultants believe it is a good solution	Offer the minimum additional loading.
Consultants push the companies having UAV capacity	Not convinced the Minister of Interior
	Not convinced the Minister of Tourism
	Cost is not known

After the analysis of the strengths and weaknesses of three options. Combined with the situation of Bongola, the terrible state of the economy, and the three most critical aspects identified for success are increase security, reduce poaching and finding game. We compare the two company of each option for choosing the most dangerous competitors.

2.1 Comparison between 2 companies of each option

4) Comparison the two companies of ultra-light aircraft as table 2-4.

Table 2-4 Comparison between Gunther and Blue Sky

Gunther		Blue Sky	
Strengths	Weaknesses	Strengths	Weaknesses
Occupy 60% of the balloon market	Can't manufacture locally	Political support at high level	Can't manufacture locally
Quality and safety is demonstrated	Spare parts are imported	Owned by the Chinese government	Spare parts are imported
		Prices are low	Quality can not be demonstrated
		China intends to invest a lot	
large companies		Large companies	
Be able to add the required features		Be able to add the required features	
Balloons are classified as leisure equipment		Balloons are classified as leisure equipment	
Subject to normal import controls		Subject to normal import controls	

From the comparison of the two companies, we can see that Gunther company is more suitable for the requirement of customer. Although Blue Sky has a low price and Chinese government could invest a lot, it has a serious weakness that the quality can't be demonstrated. While one of the three most critical aspect is quality, and it has more market share which is so important for the development of a company. So Gunther is more dangerous for us, and we choose Gunther as one of our competitor.

5) Comparison the two companies of ultra-light aircraft as table 2-5.

Table 2-5 Comparison between Rambflight and Parisair

RAMBFLIGHT		PARISAIR(ourselves)	
Strengths	Weaknesses	Strengths	Weaknesses
	Occupy 40% of the market	Occupy 60% of the market	Higher weight
In country repair	close to urban areas	In country repair	
Service depots	Reliability has been a problem	Service depots	
Employ a number of very experienced staff from their own country to maintain relationships with their customers and to maintain aircraft and train pilots.		Employ a number of very experienced staff from their own country to maintain relationships with their customers and to maintain aircraft and train pilots.	Lower payload / range ratio making it more expensive to run
Invested quite heavily		Most reliable	
Sponsoring a number of programs of personal interest		Rigorous training &testing regime	
Recruit a number of ex-military people		Ensured that pilots return safely	
		Wider distribution	

From the comparison of the two companies, it is obvious that our company has a clear advantage. No matter the market share, cost, quality or distribution, we are more excellent on each aspect, so Rambflight isn't our dangerous competitor.

6) Comparison the two companies of UAV as table 2-6.

Table 2-6 Comparison between Skywatch and Eurofrone

SKYWATCH		EUROFRONE	
Strengths	Weaknesses	Strengths	Weaknesses
Full range	Result of review is not yet known	Full range	
Strong interest		Customers includes Interior ministries	
Assigned their best specialists		Performed a large review of needs	
		Experienced in export-projects	
		Know how to address all related aspect	

It is clear that Eurofrone company has more advantages and there is no obvious shortcoming. Which might be our dangerous competitor. But, it desn't have enough information for the judgment of costumer, which is the serious problem, so our advantage is still significant.

3 Discriminator

1) A wider distribution of repair and service depots

Our company has the largest ultra-light aircraft market with 60% in BONGOLA. As a result of that, Parisair has a wider distribution of repair and service depots, which can provide the most efficient aircraft operations service in a timely manner.

As we all know: ultra-light aircraft operations, maintenance and other basic services is very important. After the operation of the aircraft, timely and effective technical support is essential. So, for aircraft suppliers, we provide not only the best performance of the aircraft, there is a set of service security system for the ultra-light aircraft in their entire life cycle. And all the after-sales service are dependent to the repair and service depots. The company fully consider customer needs, we not only established sufficient repair and service depots, but also distribute the repair and service depots as widely as possible. With all our considerations, customers can save a lot of repair and service costs. In addition, our company employs BONGOLA local workers. It provides extremely effective protection for the repair and service work at the same time to provide job positions for local pepole. The selected areas of the entertainment project is very scattered and remote. Therefore, our company's distributed service station is undoubtedly the best choice for the BONGOLA government!

2) A rigorous training and testing regime

Parisair's product is seen as the most reliable for that it has a rigorous training and testing regime! Now, it has ensured that pilots return safely.

The company has a strong backgroun in the ultra-light aircraft production and service. Our company has a good reputation in the international market, These are due to the rigorous training and testing regime of the company. In our Company, we strictly apply the airworthiness regulations of the aircraft to test and training aircraft, and hired professional engineers of professional organizations for data analysis and validation. In addition, we have set up a dedicated quality assessment department for the monitoring of each test and training step of the aircraft. With this interlocking mechanism, the company has ensured the best reliability of each aircraft.

4 Bidder’s comparison matrix

Fill-in the following bidder’s comparison matrix as table 4-1, with the appropriate weights, in order to compare your position with the one of your two main competitors:

Table 4-1 Bidder’s comparison matrix

Issues	Customer Weighting	Ourselves	Competitor X	Competitor Y
Price	20%	17%	35%	15%
Coverage range	18%	18%	10%	20%

Be easily maintainable	17%	20%	5%	10%
Safety	15%	15%	10%	10%
Contribution to the development of economy	10%	10%	5%	5%
Being piloted by personnel who receive flight training	10%	10%	20%	20%
Easily transportable	10%	10%	15%	20%
TOTAL:	100%	100%	100%	100%

- We will highlight our strength in “coverage range” by indicating the range and speed of our product.
- We will highlight our strength in “easily maintainable” by training of the engineers and providing the technical support and material.
- We will highlight our strength in “safety” by emphasize the difficulty of obtaining airworthiness certification
- We will mitigate our weakness in “price” by stressing that there is no good goods cheap
- We will downgrade our competitor strength in “easily transportable”by indicating that this is not so important for the customer.
- We will highlight our competitor weakness in“Contribution to the development of economy”by indicating that we can create jobs and train workers to be more technical.

5 Develop & Describe to Customer your solution

5.1 Type and characteristics：

Our product is ultra-light aircraft AD200. This type of the aircraft can accommodate two persons, one is the pilot, the other is the worker who inspects the Game Reserves. Its range is 500km, speed is 80km/h, flight height is 4000m and reference price is 300000RMB.

Its detail characteristics as the table below show:

Table 5.1 Characteristics of the aircraft

Outline appearances	**Dimension**
Span	8.68m
Length of the fuselage	5.02m
Height of the aircraft	1.71m
Square of the span	10.63m^2

Wing aspect ratio	7.09
Wing front edge sweep angle	12°
Main track	1.4m

5.2 Number and location：

The area to be surveyed comprises five separate Game Reserves with the following areas: 900km2, 1500 km2, 2500 km2, 5500 km2 and 7500km2. The greatest zone is 7500km2, its diagonal length is 120km. Our product's range is 500km, so every zone need only one aircraft to service, and one spare aircraft, totally you need to buy at least six aircraft.

5.3 Deployment：

The flight height is 4000m, man can see at least 30km if the weather is OK.

For zone 1， the length of cruise Line is 85km, less than the range. You need 2 pilots to fly twice a day and 1 workers to inspect the zone. If the speed is 80km/h, it will spend 2h. As the figure 5.1 show:

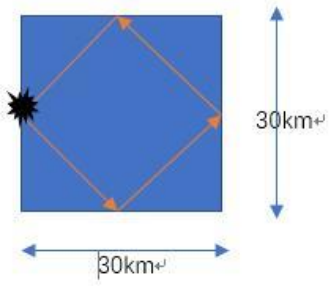

Figure 5.1

For zone 2, the length of cruise Line is 100km, less than the range. You need 2 pilots to fly twice a day and 1 workers to inspect the zone. If the speed is 80km/h, it will spend 2.5 h. As the figure 5.2 show:

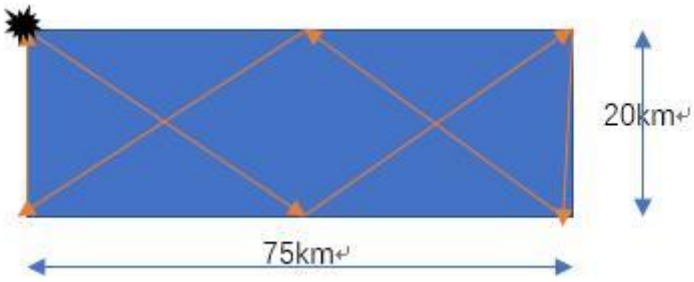

Figure 5.2

For zone 3, the length of cruise Line is 141km, less than the range. You need 2 pilots to fly twice a day and 1 workers to inspect the zone. If the speed is 80km/h, it will spend 3.5 h. As the figure 5.3 show:

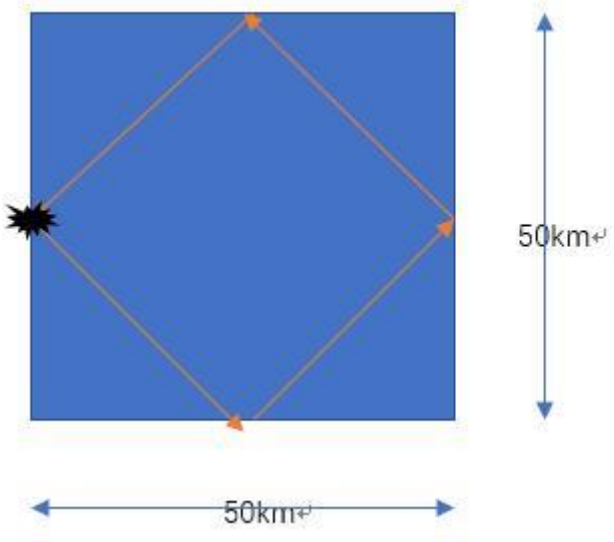

Figure 5.3

For zone 4, the length of cruise Line is 296km, less than the range. You need 2 pilots to fly twice a day and 2 workers to inspect the zone. If the speed is 80km/h, it will spend 7.4 h. As the figure 5.4 show:

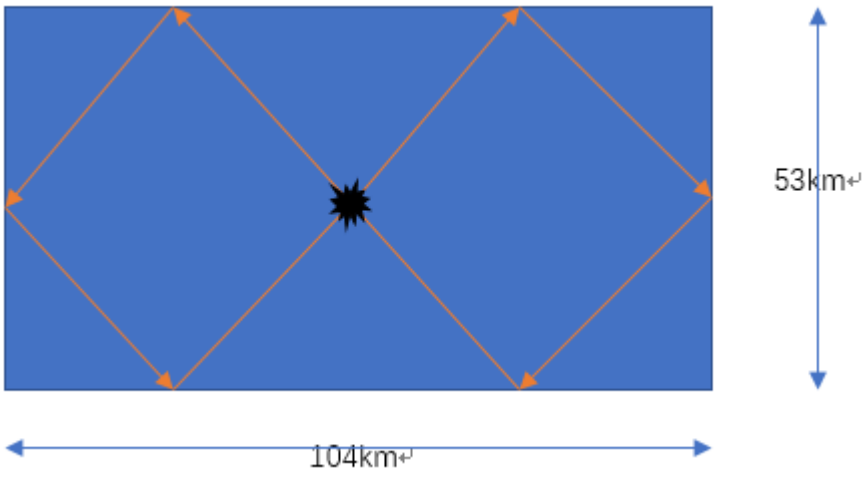

Figure 5.4

For zone 5, the length of cruise Line is 352km, less than the range. You need 2 pilots to fly twice a day and 2 workers to inspect the zone. If the speed is 80km/h, it will spend 9 h. As the figure 5.5 show:

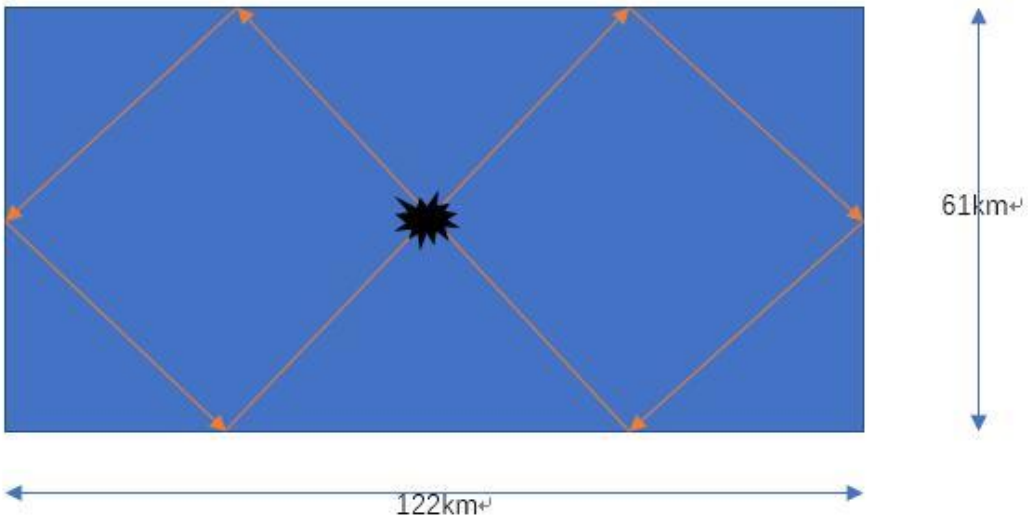

Figure 5.5

In order to take into account the entire area, it is intended to build a base station at each regional center to provide refueling maintenance services for the aircraft and to provide logistical services to pilots and maintenance staff. The black spot is the base station and there are 10 workers to ensure the maintenance of the aircraft. We can see clearly by the table below:

Table 5.2 Employment

Zones	Areas (km^2)	Pilots (persons)	Workers (persons)	Time (hours)	Maintenance (persons)	Logistics (persons)
1	900	2	1	2	10	20
2	1500	2	1	2.5	10	20
3	2500	2	1	3.5	10	30
4	5500	2	2	7.4	10	50
5	7500	2	2	9	10	70

5.4 Training, maintenance

Our company has a rigorous training and testing regime, which so far has ensured that pilots return safely.

For each aircraft ,you need two pilots for shift，so we will train ten persons for pilots. Students need to go through the system of theoretical study and flight practice, after passing the exam, are eligible to the Civil Aviation Authority to receive flight driving

license, also have the right to drive light aircraft heaven, through the trainer will get the international common "single issued to the land of private pilot license. "The training time is about six months.

For each base station, you need ten maintenance persons, so we will train fifty persons for maintenance, the training time is about three months.

5.5 Logistics

For every 1500km2, there need a supply station to provide something necessary, it need ten persons. And for each base station, it need ten workers for logistics services.

5.6 Benefits & Objective reasons

We can describe it from two parts, one is the strengths of the ultra-light aircraft:

1) Far less susceptible to wind: The Game Reserve is in the open sky, so the weather is unpredictable, our product can do a more stable job.
2) Carry additional weight: If there is some: AD200 is 100kg, and its maximum take-off weight is 300kg, so if you want, you can use it for cargo freight.
3) A good solution in terms of ease of flying: AD200 is a ultra-light aircraft, reliable and controllable, so you do not spend too much energy to manage or make a great system.
4) Resilience to failure: If there are some little problems on the aircraft, after quality inspection and maintenance, it can continue to fly, so you can save much money.
5) Ultra-light aircraft can be flown as a slider for some considerable distance, so it can ensure the safety of the pilots and people on the ground. This property can increase the safety of the Game Reserve, which can appeal more customers.

The other one is the strengths of my company:

1) Our company's aircraft manufacturing technology is very mature, safe and reliable and the price is much lower than other products on the market. If you choose us, you can save much money and get a high cost performance product.
2) Our company has a wider distribution of repair and service depots, which can provide the most efficient aircraft operations service in a timely manner.
3) We have a rigorous training and testing regime, and we can help you to train the pilots and maintenance people of your country, these high-tech talent people are your company's wealth.
4) We plans to help you build base stations, monitor the route to meet the minimum cost

requirements, which can save much money.

5) Logistics and staff needs to create a large number of jobs, which can drive the local economic development. This is the Minister of Interior want to see, and can easily get the support of the government.

6 Make an "Executive Summary" of your Project

As we already analyzed the background of this project, BONGOLA Republic plans to purchase a number of air vehicles to be used in remote field locations to monitor the status of up to 5 Game Reserves that are under the control of the Minister of the Interior.

We should firstly consider the custom issues

Table 6-1 Customer issues

Issues	Customer Weighting	Ourselves
Price	20%	17%
Coverage range	18%	18%
Be easily maintainable	17%	20%
Safety	15%	15%
Contribution to the development of economy	10%	10%
Being piloted by personnel who receive flight training	10%	10%
Easily transportable	10%	10%
TOTAL:	100%	100%

Because the budget of the government is very limited, so we put the price on a very important position with a high weight. And the second is the coverage range to meet the requirement of the Tourism Minister that all these critical areas can be supervised by ultra-light aircraft, and our project can accomplish this task perfectly with a same weight of 18%. Be easily maintainable can also reduce the cost of customers, so we put it in the third place, meanwhile, our company have a in country repair and service depots that can greatly reduce the cost of repairing and can make the aircraft more easily to maintain. The left customer issues are safety, Contribution to the development of economy, Being piloted by personnel who receive flight training and Easily transportable.

Comparing the corresponding proportion between our company and costumer issues, it can be concluded that we can meet all the requirement of customers i.e. the government of BONGOLA, and the proportions are also very accordant.

Our company have many strengths compared to the competitors, but also have some few

weaknesses.

As for the strengths and weaknesses, we analyze them from the aspect of the type of transportation and the aspect of our own company. The results are shown in the following tables.

Table 6-2 From the aspect of the type of transportation

Strengths	Weaknesses
far less susceptible to wind	requires a strip of clear land
carry additional weight	expensive
a good solution in terms of ease of flying	
resilience to failure	
greater payload than the UAV	less payload than the balloon
ultra-light can be flown as a glider for some considerab distance	

Table6-3 From the aspect of our company

Strengths	Weaknesses
60% of the market	higher weight
in country repair	expensive
service depots	
wider distribution.	
employ a number of very experienced staff from their own country to maintain relationships with their customers and to maintain aircraft and train pilots.	lower payload / range ratio making it mo expensive to run
most reliable	
rigorous training &testing regime	
ensured that pilots return safely	

Comparing to other competitor, we have two outstanding discrimitor, that is A wider distribution of repair and service depots and A rigorous training and testing regime. This two discriminator make our project more economic, safety, reliable than others.

Taking into all the factors we've discussed, The basic plan of our project is shown as follows.

Table 6-4 Details of the project

Outline appearances	**Dimension**
Rang of aircrafts	500km
Number of aircrafts	6
Number of bases	5

If our project succeed in bidding, we can bring the customers many benefits such as increase the financial income of the government, protect the safety of the five critical areas,

increase the chances of employment domestic, etc.

7 Make a WBS for your Project

1) Work Breakdown Structure

We design the WBS according work process and work content as figure 7-1. Firstly, according to work process we could breakdown the work as need analysis, product design, product development and after sale. While, some work could implement at the same time, and each of them could constitute one of the branch of the system, that are product development, base station construction and training. And each branch has some work packages, which is the bottom elements of the WBS, and the smallest "deliverable results", And these deliverables are easy to identify to complete its activities, costs and organization as well as resource information.

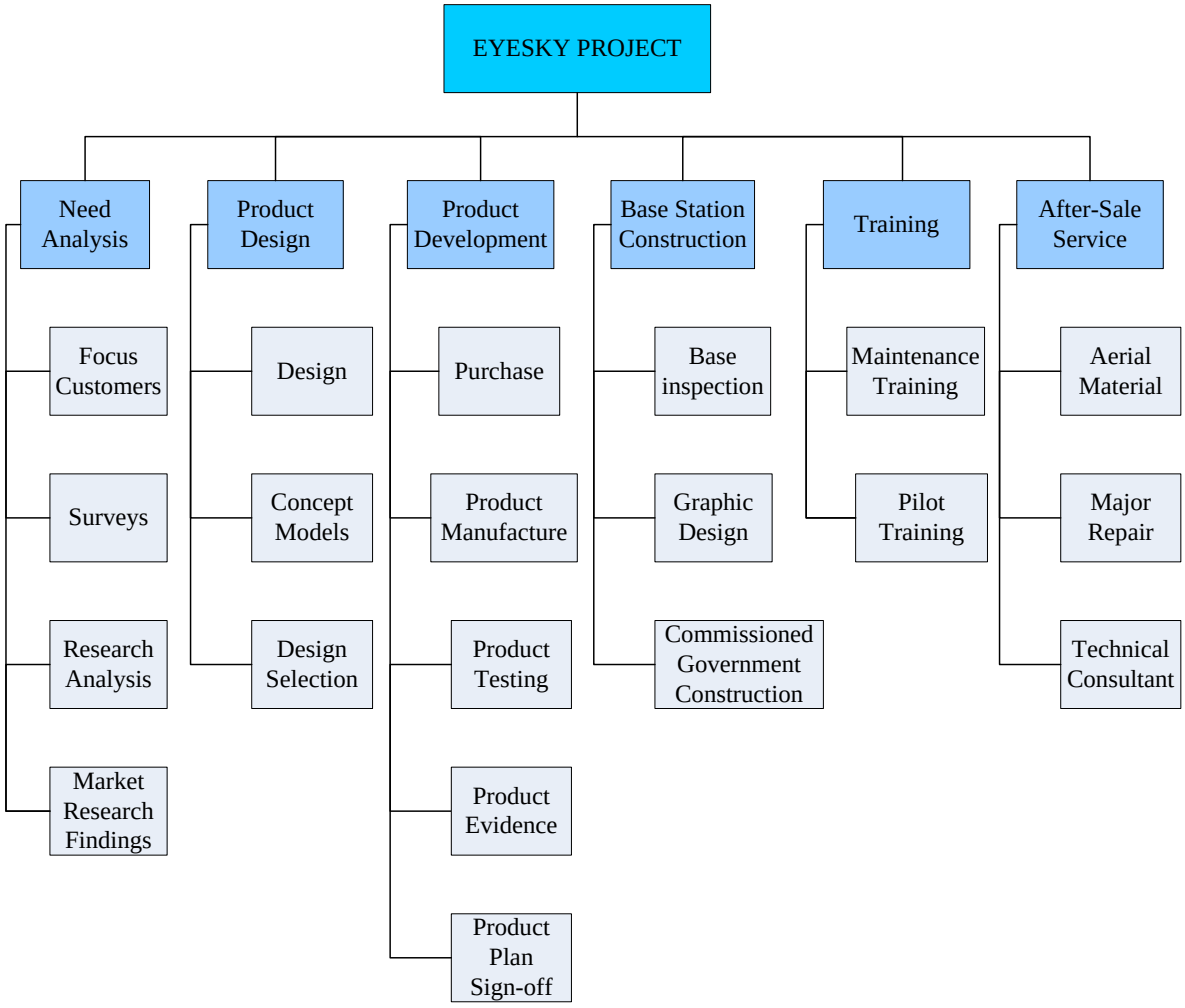

Fig 7-1 WBS

2) Gantt chart of project

Our project sets up from 1.June.2017 and plans to finish at 1.February.2018, lasting approximately 8 months, the Gantt chart of project as figure7-2.

Firstly, we start understanding the focus of customer, then make a survey, and then analysis the survey result, finally is the market research finding, the first stage is finished. The second stage is Product design, which spends about one month. The third stage is product development, at the same time it could construct base station and carry out the training work, all of them needs a lot of time to ensure security , around 6 months. Finally, is the after sale, which is a long time work which throughout the life of the system.

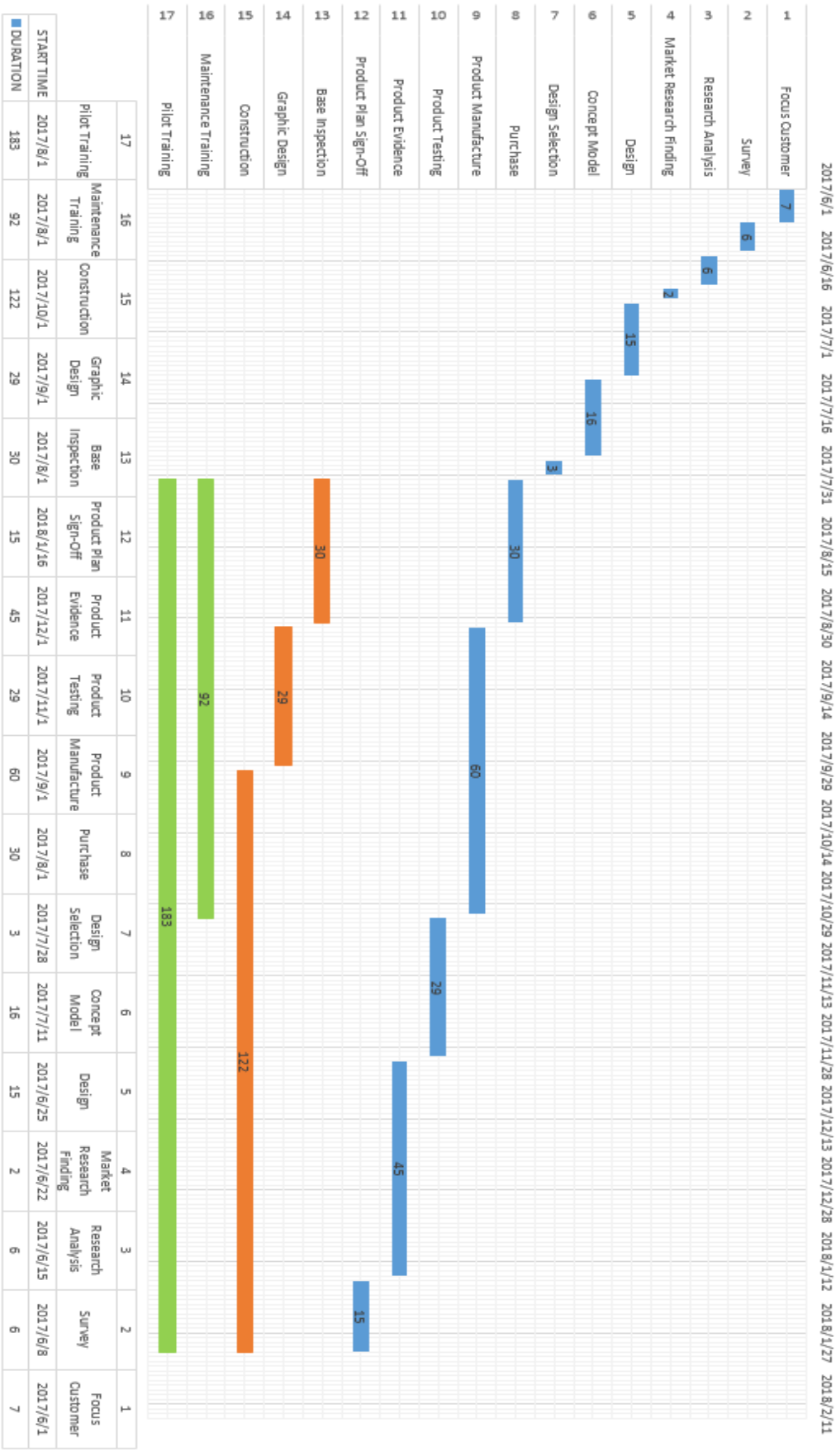

Fig7-2 Gantt chart of project

8 Determine the approximate COST & PRICE of your Project

The realistic range for the budget is expressed as following table 8-1. It costs about 4,127,264 yuan for operating all issues of this project. There are mainly 5 parts of our costs, including the purchase of Ultra-light aircrafts, earlier stage preparation, Aircraft modification, Airport graphic design and Training. Figure 1 indicates the percentage of each sub-project. We put the most of our money into the purchase of Ultra-light aircrafts ,Aircraft modification and Training. Among them, training accounts for the largest proportion, and next is the the purchase of Ultra-light aircrafts. So our company has strict technical requirements and good safety protection.

Some details should be explained. A ultra-light aircraft costs about 15,000 yuan, we estimate that we need 6 Ultra-light aircrafts for 5 logistics sites, and the modification of Ultra-light aircrafts requires about 687,264 yuan in total. There are two weeks to modify the aircraft. And there are 2 engineers and 8 workers. They work 8 hours a day. The cost of one hour will be assumed to be 30 € for engineers and 20 € for workers. There we assume 1 € =7.6 yuan. The airworthiness certification needs 500,000 yuan. In terms of earlier stage preparation, it consists of public relations fee that costs 50,000 yuan and Project Management costing 80,000 yuan. For training, there are two parts: one is for maintenance staffs, another is for pilot. The maintenance staffs have a three-month training period, and during this period each one has a salary of 20,000 yuan. The pilots have six months of training period, during which thy not only accept the theoretical guidance costing 6,000 yuan, but also practice 70 hours to fly. The cost of one hour will be assumed to be 700 yuan. So one pilot has 55,000 yuan.

According to the question, the S&M coefficient to derive a Price from a Cost will be assumed to be 1.5, so we have the price of one ultra-light aircraft which equals to 1,031,816 yuan.

Table 8-1 : The Budget of project

ID	Name Eye in the sky Project	Cost(Yuan)
1	Earlier Stage Preparation	130,000
1.1	Public relations fee	50,000
1.2	Project Management	80,000
2	Aircraft modification	687,264
2.1	Engineer	51,072
2.2	Worker	136,192
2.3	Airworthiness certification	500,000
3	Ultra-light aircraft	1,500,000
4	Airport graphic design	150,000

5	Training	1,660,000
5.1	Maintenance staff	1,000,000
5.2	Pilot	660,000
	TOTAL	4,127,264

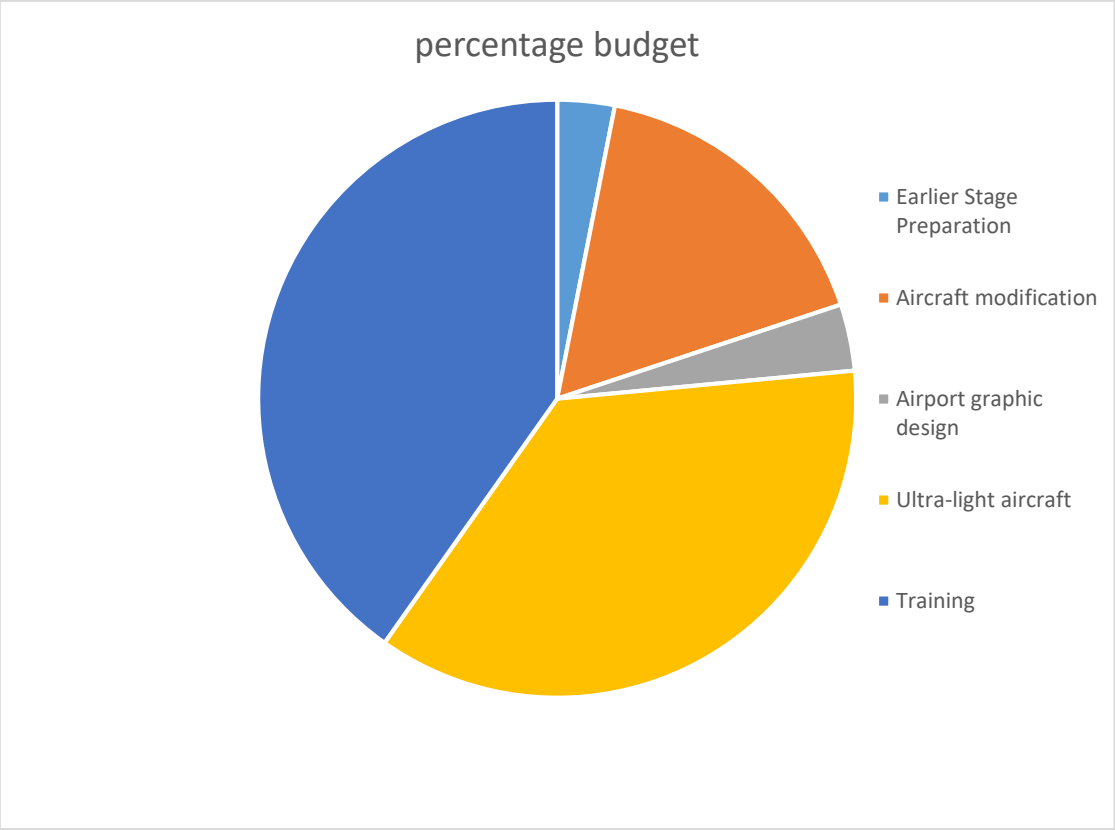

Fig 8-1: The percentage budget of each sub-project