MASTER THESIS

TITLE: Business plan for a technologically advanced security company

MASTER DEGREE: Master in Science in Telecommunication Engineering & Management

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Overview

The purpose of this project is the creation of a Business Plan for a security company. The project is divided into 6 chapters that conforms a solid study containing the most important points in the creation of a new company.

In order to achieve these objectives each chapter has its own subject.

The first chapter constrains the business activity sector, its profile and the services offered by the company. The second chapter presents a selection of products in order to accomplish the different activities carried out by the company and the pricing of the products offered by the company in relationship with the market are analyzed in this chapter. In chapter three, is studied the economical position of the market sector based on the results obtained from the considered, competitor companies. The fourth chapter describes the characteristics of the company such as the targets, the structure, the employee's profiles and other characteristics. The fifth chapter exposes the economical and financial plan for the first three years of business activity and analyzes the possible figures. Finally, in chapter six the conclusions, the future work and the environmental impacts are presented.

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Resumen

El objetivo de este proyecto es la creación de un Plan de Negocios para una empresa de seguridad privada. El proyecto está dividido en 6 capítulos que conforman un sólido estudio que contiene los puntos más importantes, a tener en cuenta, en la creación de una nueva empresa.

Con el fin de lograr estos objetivos, cada capítulo tiene su propio fin.

El primer capítulo se limita a la actividad empresarial del sector, al perfil y a los servicios ofrecidos por la empresa. El segundo capítulo presenta una selección de productos necesarios para realizar las diferentes actividades llevadas a cabo por la empresa y a la fijación de precios de los productos ofrecidos por la empresa en relación con las necesidades del mercado. En el capítulo tres, se realiza un estudio de los ratios económicos del mercado a partir de los resultados obtenidos de la competencia. El cuarto capítulo describe las características de la empresa tales como los objetivos del mercado, la estructura interna de la empresa y la de los empleados además de otras características. En el quinto capítulo se expone el plan económico y financiero para los tres primeros años de la actividad empresarial. Por último, en el capítulo seis se presentan las conclusiones, el trabajo futuro y los impactos ambientales.

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CHAPTER 1. INTRODUCTION

In a world where every day the number of robberies, theft and hence the violence in general is increasing and there is no expectation for it to decrease, the people's fears are on the rise and also their insecurity about feeling safety in their own homes.

Hence the market of the security companies is always growing and improving its products and services in order to give the best service and solution to their customers.

The main objective of this project is value the possibility and the viability of the creation of a new security company in the Spanish market. Hence, this project is composed by different chapters, each one with a different purpose in order to achieve all the necessary points to make a decision about the feasibility of the project.

1.1.   Security

This point gives a general idea about what is security and what are the main types of security that the enterprise will offer as a start-up.

1.1.1.   What is Security?

Nowadays the term Security has different meanings depending on the context in which it is used. A general definition given by the Merriam-Webster dictionary is the next:

- "The quality or state of being secure as a: freedom from danger: safety b: freedom from fear or anxiety c: freedom from the prospect of being laid off"

- "a: Something that secures: protection b (1): measures taken to guard against espionage or sabotage, crime, attack, or escape (2): an organization or department whose task is security. "

The last definition is better for describing the work of a Security Company. The main objective of a security company is to install, in an area (particular house, commercial local, in a company, etc), the opportune measures (usually an alarm system) to take guard against any type of physical danger and then make the owners feel safely.

It is important to know that the measures installed by the enterprise do not offer security, the function of the installed system is to inform to the Central Alarm Node (CAN) of the company about the alarm where appropriate measures will be taken in order to give this security.

1.1.2.   Types of Security

Knowing the definition of security, now it is possible to define what will be the three basic activities of security in which will be involved the future enterprise. Basically, the work will be focused in three ways: **in the Private Security (theft prevention), in Fire Prevention and in Video Surveillance Systems.**

Next will be explained some characteristics of each line of work.

- **Private Security**

The world of the Private Security is regulated by the *Ministerio de Interior* which has approved different rules in order to assure the correct use of this field of service.

Probably, the most important approved rule is the law 23/1992 of 30 July that specifies the general characteristics that have to be meet by companies dedicated to private security. Also, in this law, in the article 5 specifies the competences concerning an enterprise working in this sector.

Basically, there are seven different competences in the private security sector that can be summarized as follows:

1. Surveillance and protection of goods, establishments, spectacles, competitions or conventions.
2. Protection of certain people, after a previous authorization.
3. Deposit, custody, recount and classification of coins and notes or of other objects with a high value that need special protection.
4. Transport and distribution of the objects mentioned in the last point with special vehicles.
5. Installation and maintenance of machines, devices and security systems.
6. Use of centrals for the reception, verification and the transmission of the alarm signals and its communication to the Forces and Security Forces of the State.
7. Planning and advice about the security activities contemplated in this law.

Another well-known activity of the private security companies is to provide private security guards. This activity is contemplated in this law in the article 11 and is necessary to have to comply by it to offer some of the latter mentioned competences.

In any case, all these services will not be offered by the start-up enterprise. From the previous list of activities, only the last three activities (5, 6 and 7) will be selected . To offer the first four activities the use of private guards would be necessary that the enterprise will not have in its start-up.

All the selected activities have the same purpose: theft prevention. It is possible to divide theft prevention in two different categories: theft and pilfering (shoplifting) where the systems used for avoid these types of theft are different.

The main difference between a system of pilfering prevention from a normal theft prevention system is the connection with the CAN. Usually, the pilfering systems are not connected to the CAN but when the system detects a break-in, the pilfering alarm activates a visual and audible signal which advises the people working.

In theft prevention the system is always connected to the CAN of the security company. When the system detects an intrusion, an alarm signal is sent to the CAN where actions are taken depending on the type of the alarm.

The activity of the enterprise will be centered on the theft prevention and not on the pilfering.

- **Fire Prevention**

The Fire Prevention is regulated by another organism different than the private security, in this case is the *Ministerio de Industria*. This organism, like the organism that regulates the private security activity, has its own normative.

In this case, it is important to emphasize two different normative: the NBE-CPI-96 (*Norma Básica de la Edificación – Condiciones de Protección contra Incendios*) and the CTE-SI (*Código Técnico de la Edificación – Seguridad en caso de Incendio*). The NBE-CPI-96 is an old normative but nowadays is so used in the old installations and it is important to take it into consideration, on the other hand the CTE-SI is the new normative (from the 2006) and is used for the new installations. In both normative the fire preventive installations for the proper detection of fire are thoroughly detailed.

The main objective of a Fire Prevention System is to identify a developing fire emergency in a timely manner, while alerting the occupants of the building and the CAN of the company which will alert the local fire-fighters.

A fire can be detected through smoke, flame or heat. Therefore, nowadays various sensors are available in the market which are capable of detecting these different signals intended for fire prevention systems.

- **Video Surveillance Systems**

Video surveillance systems are based upon closed-circuit television (CCTV). These systems consist of video cameras where the signals are sent to a specific location, to a recorder or to a set of monitors.

In this case, there are not any organisms that regulate the use of these systems nor any specific laws in order to control their usage in public areas. Although there are no laws to regulate this practice, there are some laws that can be

infringed by the use of the CCTV, like the Organic Law 1/1982 about the protection of the people's privacy.

1.1.3.   Conclusions

In this chapter the meaning of the word security and also the types of security that the enterprise will offer have been defined.

As a result, the following services will be offered by the enterprise in its start-up:
- Private Security
  - Installation and maintenance of machines, devices and security systems.
  - Use of central stations for the reception, verification and the transmission of the alarm signals and its communication to the Forces and Security Forces of the State.
  - Planning and consulting over the security activities contemplated in the latter mentioned laws.

- Fire Prevention
  - Installation and maintenance of fire prevention systems.

- Video Surveillance Systems
  - Installation and maintenance of closed-circuit television networks.

1.2.   Enterprise Activities

The company in its start-up will offer three different services in the field of Private Security, Fire Prevention and CCTV. These services define the principal activity of the company and for its fulfillment, it is necessary to define some processes to insure the correct functioning of the offered services.

- The reception, verification and transmission of the alarm signals done it in the Central Alarm Node.

- The planning and advice of installations and of security activities done it by the engineers.

- The deployment and maintenance of the installations of the customers done it by the installers.

Next will be explained these activities and the processes to ensure Quality of Service:

1.2.1.   Reception, verification and transmission of alarm signals.

The CAN is one of the most important activities that a security company must have. The central alarm node is a room inside a bunker where all the alarms central of the customers are connected and where all the signals (alarm, emergency and test signals) are received. For example, when one alarm is activated in the home of some customer, the CAN receives a signal alarm with information about the user and the device that has produced the alarm.

When an alarm arrives to the CAN, the people who are working there must make an appropriate decision about the alarm (false or a real intrusion has taken place). The procedure followed when an alarm is activated is very important in order to classify the type of alarm.

The diagram in figure 1.1, illustrates a possible workflow for alarm reception management. When an alarm is received, the first step is to contact with the customer. It is important to know if the customer is in its home or not because the majority of times, the triggered alarms are produced by the customers themselves.

The contacted customer may be at home or away. If the customer is at its home, then probably the alarm is caused due to an error by the customer hence the CAN would proceed to restart the system. However, if the customer answers with an incorrect pass phrase (when the CAN calls the customer he or she should always reply with a secret word/pass phrase accorded with customer after the installation of the security system) or if it seems that he/she is being coerced the procedure is to call the police.

On the other hand if it has not been possible to contact the client or he/she is not at home, the next step is to identify which device of the installation has set off the alarm. Knowing what detector has sent the alarm signal and its location in the house, it is possible to know the things that this detector is guarding. If at the location of detector there are no objects of value and no more alarms have been set off, then the alarm is classified as a false alarm and the system is restarted. On the other hand, if there happen to be things of value at the location (jewelry, safe box, etc) or more detectors have been set off, the procedure is to call the police.

The following schematic summarizes this procedure:
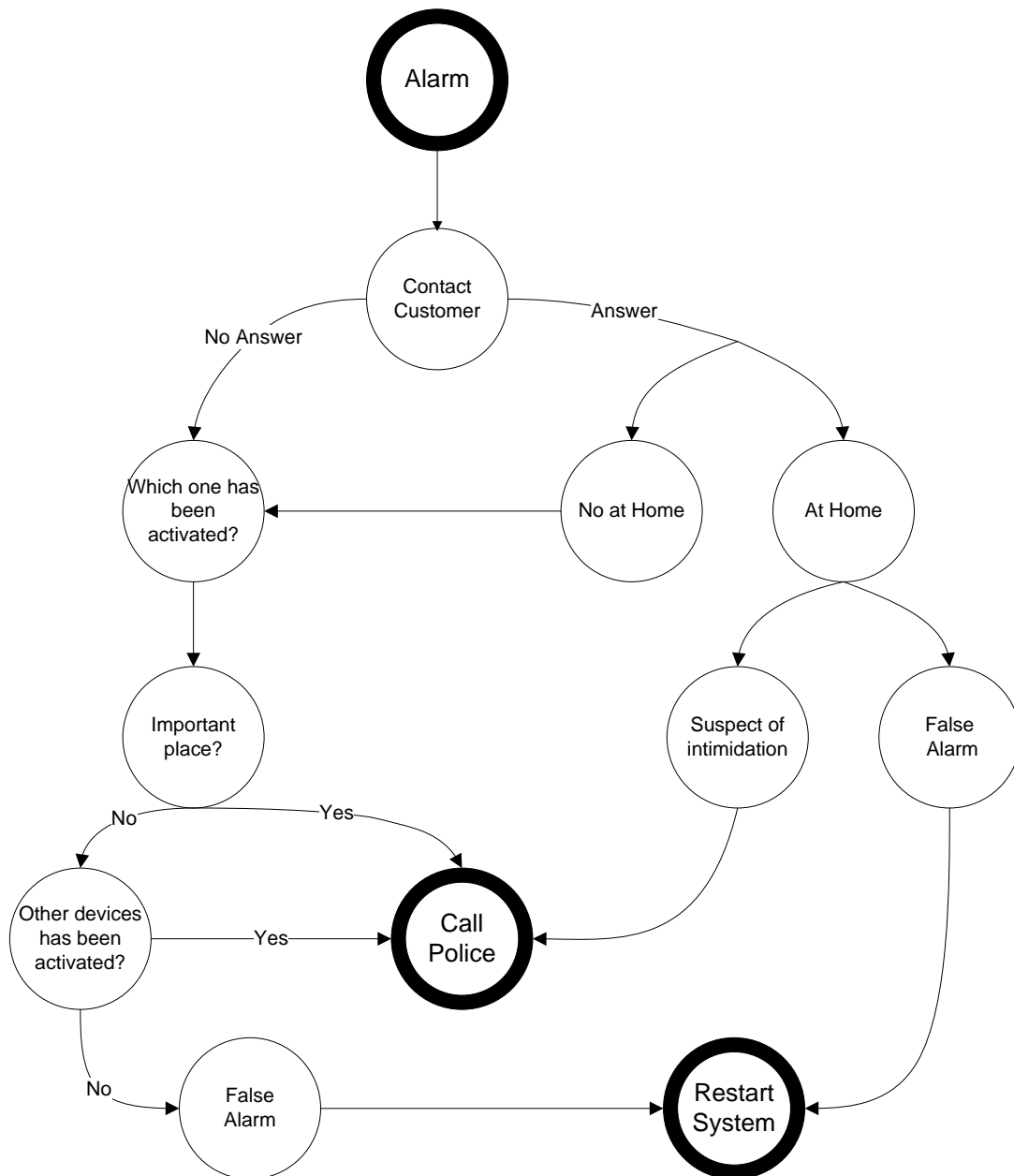
Fig 1.1 Alarm Procedure

If the company had guard services, then a guard would go to check the alarm in the case that the customers were not at home. As this service is not offered in the start-up is very important to identify the alarms correctly.

In fact, the correct functioning and the quality of service offered by the company at its upstart is very important concerning its reputation and credibility. Though the recent market studies concerning monetary value of reputation yielding more revenue (more so in the field of e-commerce), the company's credibility is even more so important. The credibility with the law enforcement authority such as the police department determines their response to the distress calls made on behalf of the company whenever an alarm is set off. Moreover if the call

proves to be a false alarm the law enforcement authority would fine the security company.

1.2.2. Planning and advice of installations and security activities

The planning and the consulting services related to security activities must be carried away a qualified engineer of the company. The diagram 1.2 a schematic of the workflow of such activities can be observed.
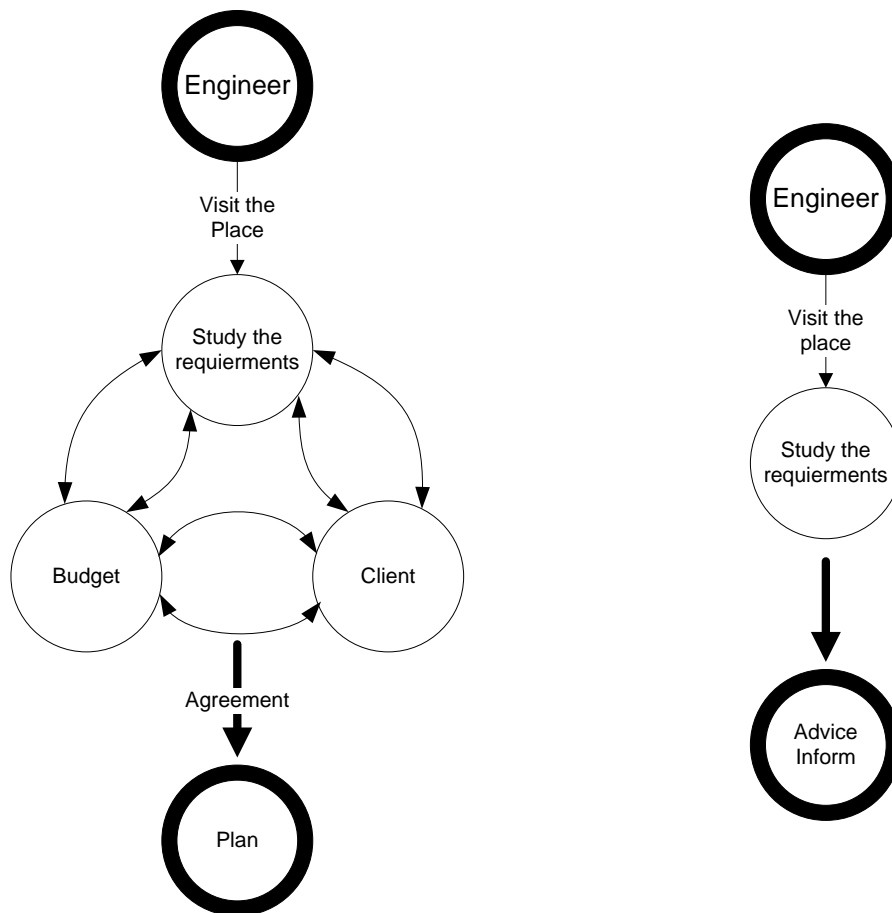
Fig 1.2 Planning and Advice

In both cases, the engineer is who analyzes the requirements for the installation. If the analysis has the goal of a future security installation for a potential customer, the diagram on the left would be the one applying since the budget approval on behalf of the client is vital part of this process. On the other hand, if the work is purely advising purposes the right hand diagram would apply to give the best solution without taking into account the cost of the project (if the budget is important, then we would revert back to the left hand diagram).

The procedure followed in the left hand diagram would be as such: the engineer goes to visit the location where the system security will be installed and studies the requirements of the location and estimates the costs that the client has to agree upon. If there is no agreement because the client does not express his/her conformity with the requirements of the installation or with the budget, then the installation estimations would be rescaled all but advising the client about the consequences this actions. Once an agreement is reached, the engineer will proceed to create an installation plan and timetable.

As the advising case, the right hand diagram, the procedure is simpler: the engineer will visit the place and study the needed requirements to obtain the maximum level of protection and finally produces a requirements report to be delivered to the service customer.

1.2.3.   Deployment and maintenance of the installations

The deployment and maintenance of the installations are done carried on by the technicians of the company. Basically they have three different responsibilities in the company: installation of new security systems, maintenance and the possible reparations of the installed devices and periodic revisions of the systems.

In the first case, the deployment of new security systems is divided in two steps: the first one consists of the analysis of the requirements of the place which is done by the engineer, the second, is the to follow the installation plan and timetable produced by the engineer.

The technician will mount the alarm system and then check the connectivity with the CAN in order to make sure all the devices are working correctly. Finally, the technician will explain the functioning and the usage of the security system to the customers.

The figure 1.3 summarizes these procedures:
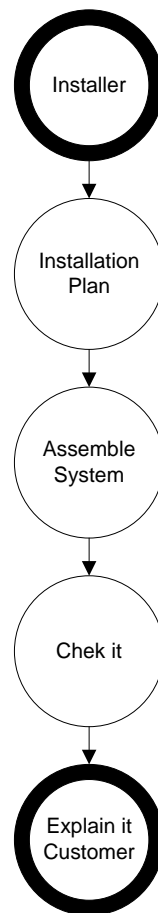
Fig 1.3 Montage

The reparations and the revisions of the system are done also by the technicians. When some device is not working well, the installer must go to the location and repair the problem or change the device. The revisions of the systems are done once a year and they consists of checking all the devices of the installation and their correct connection to the CAN. In the places where the security system is compulsory the revision is done it every three months.

CHAPTER 2. MARKET ANALYSIS

As it has been described in chapter 1, the principal activity of the enterprise is based upon offering three major services. In this chapter, will be further explain the products available in the market for each service.

Also will be done it a market study where the types of clients and the products offered to their will be analyzed.

2.1.   Products Analysis and Selection

In the market there are a lot of brands and producers offering a huge variety of products for each branch of our intended activities. The following points will analyze the products used in each type of service by giving an example of a commercial product extracted from the market.

2.1.1.   Intrusion Alarm Systems

This type of product is the most solicited by the people. The main reason of this factor is in order to prevent theft.

There are some places like banks, jeweler's shops, public buildings, etc, where the installation of a security system is compulsory. In these cases the *Reglamento de Seguridad Privada* defines the security measures that must be installed. On the other hand there are other places where these installations are not compulsory hence it is done depending on the client's needs.

An Intrusions Alarm System could be a very complex system (composed by a lot of different devices with different characteristics and functions for detection) or could be a very simply system (composed by few components that are common in all the installations). In the next points the typical devices in a common installations will be described and also the more specific products that can be considered for complex installations.

2.1.1.1.   Common Products

The next products are common in all the intrusion alarm systems, these are the minimum basics that need be met for the system for work: **alarm central, keyboard, detectors, siren and cable**.

- **Alarm Central**

In a security installation, the Alarm Central is the most important device because is the responsible of coordinate all the devices that are part of the installation.

Another important function, maybe the most important of the Alarm Central, is the communication with the Central Alarm Node that is located in the enterprise (CAN). When the CAN receives an alarm from one alarm central, it must verify if this alarm is a real alarm (the alarm has been activated because of a burglary) or a false alarm (somebody has active the alarm because he or she has forgot to deactivate it).

Bosch has a lot of different Alarm Central with different characteristics but, as an example, we will analyze the model **CC488 Solution Ultima 880 Control Panel**.

Fig 2.1 Bosch Alarm Central

The figure 2.1 shows an image of the alarm central inside a metal box. For more information refer to **A.1 Alarm Central**

- **Keyboard**

It is the interface between the user and the alarm central. With the keyboard it is possible to arm and disarm the system and also send an emergency alarm to the Central Alarm Node.

Usually it is used by the installers for programming the alarm central and also to do the necessary operations in order to test the correct functioning of the alarm system before the installation finishes.

In the market there are a lot of different keyboards, to explain the typical characteristics of a keyboard the **Bosch CP508LB LCD Codepad** has been selected. This keyboard is compatible with alarm central mentioned above.

Fig 2.2 Bosch Keyboard

In the figure 2.2 it is possible to see an image of the keyboard. In the display there are a combination of numbers and icons that show information about the state of the alarm. For more information about the main characteristics consult the **A.2 Keyboard**

- **Detectors**

Detectors are of the devices that have the responsibility of detect an intruder inside the protected area. In the market, there a lot of different detectors that use different systems to detect intrusion.

The most common detectors are the detectors of movement or PIR (Passive InfraRed sensor). This type of sensor works measuring infrared light radiation from objects in its field of view and detects the movement.

Another type of detector, very common, is the magnetic contact that is used to detect the opening of a door or a window. This device is composed by two pieces (which form a loop with the alarm central) and when these pieces are separated, an alarm signal is activated.

Below a commercial example of each type of detector is shown.

  o Movement Detector

The movement detector selected is the Bosch **ISC-PDL1-WA18GB Professional Series TriTech + Detectors with Anti-mask** that uses five different sensors to avoid the false alarms.

Fig 2.3 Bosch Movement Detector

The main characteristics of this device are explained in the **A.3 Movement Detector.**

- o Magnetic Contact

About magnetic contacts, basically there are two types: surface magnetic contacts and embedded magnetic contacts. In any case, the functioning is the same for both systems: the two parts of the contact, when are near, close a loop that is connected to the central alarm and when this loop is opened (because the two parts have been separated) the alarm central detect this and sends and alarm.

The next figure 2.4 shows an image of a surface magnetic contact and an embedded magnetic contact. The surface contact is an **ISN-CMICRO Ultra miniature Contact** and the embedded contact is an **ISN-CSTB-10 Compact Contact.**

Fig 2.4 Surface and Embedded contacts

- **Siren**

The siren is an important device in any security installation. When a sensor detects an alarm (a burglary), it sends an alarm signal to the alarm central and this activates the siren.

Most people think that the main objective of the siren is to frighten the thieves away. In fact, the main objective of the siren is to distract the thieve in order to give time to the alarm central to communicate the alarm to the CAN. This is the reason because the siren has to be far from the alarm central, if they are together the thief would find the alarm central and he could try to destroy it before the alarm central finishes to transmit the alarm signal to the central alarm node.

In the market is possible to find two different types of sirens: one for interior and the other for the exterior. Before installing an exterior siren it is necessary to consult the normative of the community because there are zones where the installation of an exterior siren is not allowed.

An example of an interior siren is shown the figure 2.5 which is the Bosch **ES991MA-ZT1.**

Fig 2.5 Interior siren

This model is powered with 12 V and has an output sound power of about 105 dB.

- **Cable**

All the devices are connected to the alarm central by cable. These cables must be shielded and twisted in order to avoid possible interferences.

Fig 2.6 Cable

2.1.1.2.   Special Products

These products are named special because there are not usual in all the alarm systems. They are more common in special installations where people need an extra level of protection.

In **A.4 Special Intrusion Alarm** products are commented some of the possible special products that could be used in an installation of the kind:

2.1.2.   Fire Alarm Systems

The installations of Fire Alarm Systems must follow the new normative of the CTE (*Código Técnico de la Edificación*) that is enforced since march 2006. In this new normative all the information about the characteristics (number of devices, distances between detectors, etc.) that a Fire Alarm System must have is described, all of which categorized depending on the characteristics of the establishment.

The second article of the normative (Application field) specifies the characteristics of the establishments that are obligated to have a Fire Alarm System installation. Basically, all the new buildings that offer public or private services like administrative, residential, sanitary, religious, etc. are obligated to have a fire alarm system. In the second article of the LOE (*Ley de la Ordenación de la Edificación*) of the 1999 these specifications are more detailed.

If the building does not fall under the latter normative, then the installation could be designed as will. At first, the company will not design Fire Alarm Systems for buildings that must follow the normative, therefore focusing on installations were the design is given by an architect which could be oversized if need may be.

2.1.2.1.   Common Products

The used in a Fire Alarm System installation are similar to the products used for a Security Systems. Both systems are designed for detect an event, a fire or an intrusion in some designated area. Next products are explained: **fire central, fire detectors, call point and siren.**

- **Fire Central**

The Fire central has the main objective of control all the devices that are monitoring the location in order to detect a possible fire. There are different types of commercial fire centrals according to the necessities of the installation.

As an example of a small Fire central that fit for generic installations the **DSC Conventional Fire Panel CFD4800** is chosen.

Fig 2.7 Fire Central

The CFD 4800 series has the capacity for 2, 4 and 8 zones, with up to a maximum of 21 devices per zone yielding a total of 168 device connections to the central. Another important characteristic is that the central is able to distinguish between an alarm activated by a sensor or by a call point.

The CFD 4800 is a central that can be used in little and normal installations.

- **Fire Detectors**

There are different fire detectors in the market that use different technologies in order to detect a fire.

  o Optic

The optic fire detector detects the smoke (particles) in the air and use an optical detector for it.

Its operation method consists in a light source (infrared LED) and an optic sensor (photodiode) that are separated with a determined angle. When smoke enters in the detector, the particles of the smoke reflect the light to the sensor. When the sensor detects light it generates an alarm signal.

The figure 2.8 shows and image of the optic detector **Z630** from **Ziton** and also shows a diagram of how an optical detector works.

Photodiode

Reflected light

Infrared LED
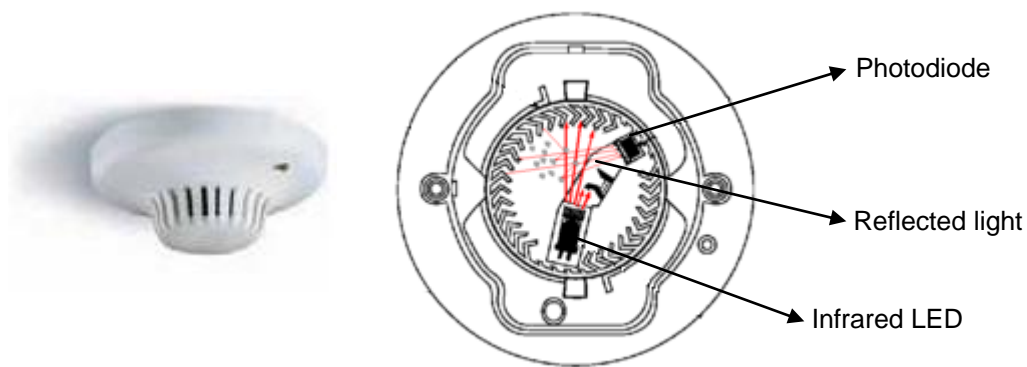
Fig 2.8 Optic detector

In the last figure 2.8 the detector is detecting the particles in the air because they are reflecting the light produced by the LED to the photodiode. In this case, the detector will generate a fire alarm signal which would be sent to the fire central.

o   Thermal

Thermal sensors use the temperature for fire detection. There are two different mainstream types of thermal sensors: one is known as a thermal detector and the other one as a heater detector. The heater detector is more advanced than the thermal detector.

The operation system of a thermal detector is quite simple, it consists of a temperature sensor which triggers the alarm when the temperature is higher than a threshold (58ºC). The heater sensor has the same operation but also detects variations in temperature, if in one minute the temperature increase about 10ºC, the detector will activate the signal alarm although the temperature has not reached the threshold.

As an example of thermal sensor the **Z620-581** and for a heater sensor the **Z620-582** could be taken into consideration, both are from Ziton. The image 2.9 shows a picture of a thermal detector.

Fig 2.9 Thermal detector

Nowadays, the smoke detectors are the most used because they detect the fire earlier than thermal detectors.

- **Call Point**

The call point is used by people that have detected the fire before the detectors of the system. The figure 2.10 shows the call point **ZC6-MCP-R** of **Ziton.**

Fig 2.10 Call Point

In order to activate the fire alarm from the call point is necessary to break the glass that is protecting the button from possible accidental activations. These call points must be locate it in the path of a security exit.

- **Siren**

The siren indicates the alarm of Fire, when the siren is activated it is because there is a fire inside the protected area. The figure 2.11 shows an example of a siren, the **ZF-MES1-RBS** of **Ziton**.

Fig 2.11 Siren

The special characteristic of this siren is that it has a flash light incorporated. The flash light is important because adds more efficiency to the signal alarm (sound + light) and also is useful for the people that have hearing problems.

2.1.2.2.   Special Products

The following special products are used in very few installations that are critical and need the maximum fire protection level. These are typical in big industries with dangerous products and are explained in **A.5 Special Fire alarm Products.**

2.1.3.   CCTV

Closed-circuit television (CCTV) are used of monitoring and ultimately guarding the locations where they are deployed. In the beginning, these types of systems were used by security guards in order to surveillance big or important areas like casinos, banks, airports, commercial centers, military installations, etc. Nowadays, the CCTV systems are used everywhere and most people want to have a CCTV system in their home for extra precautions.

The installation and the maintenance of these systems are competence of the security companies as of article 1 of the law 23/92 of 30th July of Private Security and also as of the article 39 of the Private Security Regulations (in the cases where the installation of these devices are compulsory). Although there are some laws concerning Private Security, today there is no law controlling the use of CCTV in public areas.

But it is necessary to taking in account the Organic Law 1/1982 about the Civil Protection of the Honor Right, to the Personal and Family Privacy and to the own Image in order to know what are the responsibilities that can be committed.

2.1.3.1.   Common Products

CCTV systems are conformed by few products, basically by two: **camera and recorder.**

- **Camera**

The cameras can be more or less advanced in technology depending the necessities of the customer with different characteristics and aesthetic.

The **AVZ CSM-F50483** is a color camera with variable optics (it is possible to put the camera in focus) with a resolution of 420 lines. Also this camera includes 35 infrared leds enabling a 40 meters range of night vision (0 lux).

Fig 2.12 Day/night camera

Another camera is the **ARD-982P** from **GESecurity**. This camera is for outdoor usage and has an anti-vandalism design. It is a day/night camera with a 460 lines of resolution and can be powered with 12Vdc or 24Vac current.

Fig 2.13 Anti-vandalism camera

The next images shows the difference between an image without the night vision and the other with night vision enabled (activated infrared).

Fig 2.14 Night vision

- **Recorder**

The recorders have the task of recording all the images that the cameras are capturing. Depending on the number of cameras and the characteristics of the installation a specific type of recorder is recommended.

For example the **DX-TL4U** from **Mitsubishi** shown in figure 2.15 is ideal for installations with less than four cameras.

Fig 2.15 Recorder

The characteristics of this recorder are the capacity for 4 cameras, 100 images per second in CIF (Common Intermediate Format) quality (resolution of 352 x 288), TCP/IP transmission, telemetric control, USB (Universal Serial Bus) interface.

It has a storage capacity of 160Gb for video and audio and also it has a configurable video-sensor in order to detect movement in received images from the cameras.

2.1.3.2.   *Special Products*

Special products are not used in common installations because they offer a level of security that is not necessary for average installations and also they are quite expensive. In the **A.6 Special CCTV Products** there are some examples.

2.2.   Market Study

Nowadays, Security companies are experiencing a significant growth due to rise in people's fear of robbery. With the increase of vandalism and the entrance of foreign mafias in our countries, the people are starting to feel unsafe and begin to deposit their trust in the services offered by the private security companies.

The market study is divided in three different parts: the study of the clients, the products and the prices. All these parts are interrelated.

Fig 2.16 Market graph

As its possible to observe in the figure 2.16, to define the company's market, it is necessary to define its subsets: clients, products and prices. Depending on the clients and their requirements, it will be necessary to use some products that will define the prices.

The figure 2.17 shows the scheme followed to gain a new client
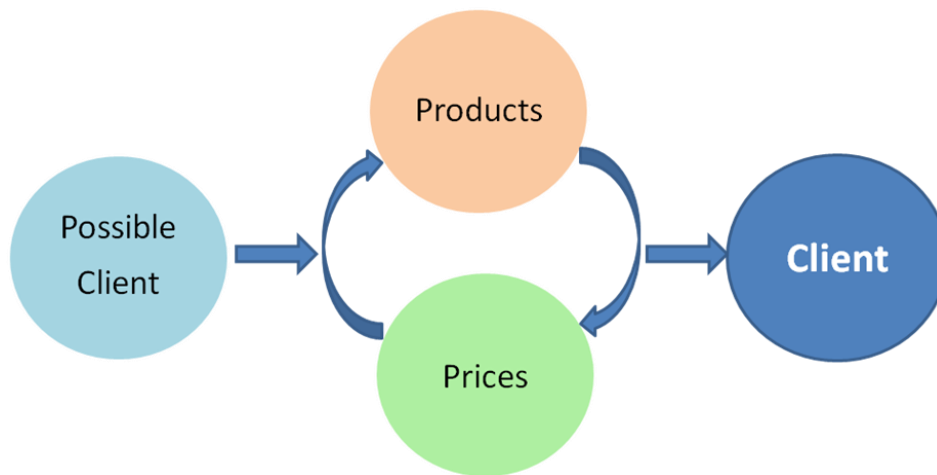
Fig 2.17 Possible Client

A possible client will look for the prices and the offered products, if he thinks that he/she is offered a good deal, probably he/she will contract the services and become a customer.

In the next section, different client profiles will be analyzed including an estimation of the products and their prices for each type of client.

2.2.1.   Client Analysis

A security company's potential clients, as can be deduced from figure 3.2, depend on products offered and their prices. All these three points are interrelated with the market, but each client will have its own products (depending on his necessities) and its own prices (depending on the products).

Basically, four different types of clients in the market can be identified: **Private, Enterprises, Shops and Projects Plan.**

- **Private**

These are the typical clients and the most common. This group is composed by all the particular people that want a security system for their home in order to feel safe.

Usually, these kinds of clients do not need special measures for their installation because they do not usually have things of great value needing special protection. If the latter does not apply, then they will be classified inside the Project Plan client because they will need special measures and a detailed study of the zone to be protected.

The installation of the security system in these cases usually is quite quick and the system is usually composed of few components.

- **Enterprises**

Enterprises are another typical group in this market. They usually have more things with a high than private clients.

Depending on the activity of the enterprise, it will be necessary to install a different solution. In any case, these installations are bigger than the installations for private clients and have more components and different devices that compose the security system.

For this kind of clients, the time of the installation is longer and is proportional the size and complexity of the installations.

- **Shops**

Shops are another client group of a security company. These clients are specially critical because they have a situation where the risk of robbery is significantly higher and the safety of the establishment more important.

Usually, the installations in these types of clients are quite considerable and composed of different security systems. Depending the shop and its characteristics a different level of protection will be necessary.

The time spent on an installation of this kind, depends on the necessity of the shop. Usually these installations are large because there are a lot of devices to be installed in order to guarantee the security of the shop (the level of security also depends with the budget of the client or if it is compulsory to have it).

- **Projects Plan**

The named Projects Plan are the clients that need special measures for their protection. These kinds of clients are usually people that have a high economical or social status.

These types of installations may need special equipment not used for normal clients. They are usually deployed in big houses which also have the necessity to protect the surrounding terrains.

The time taken for the deployment of these installations is also more considerable since more devices need to be installed and configured.

2.2.2. Products & Prices Analyses

All the products used in the installations are selected from those available in the market. Advanced products have been selected in order to avoid false alarms and hence offer the best service to the clients.

In the next points it will be described what are the typical products used in each type of client and also an estimated price of each installation.

- **Private**

Private clients usually only install the alarm system and maybe a reduced CCTV system in order to surveillance the entrance of the house.

As an example, figure 2.18 illustrates a possible design of a home done by an engineer. In this case, there is no CCTV and fire system installed.
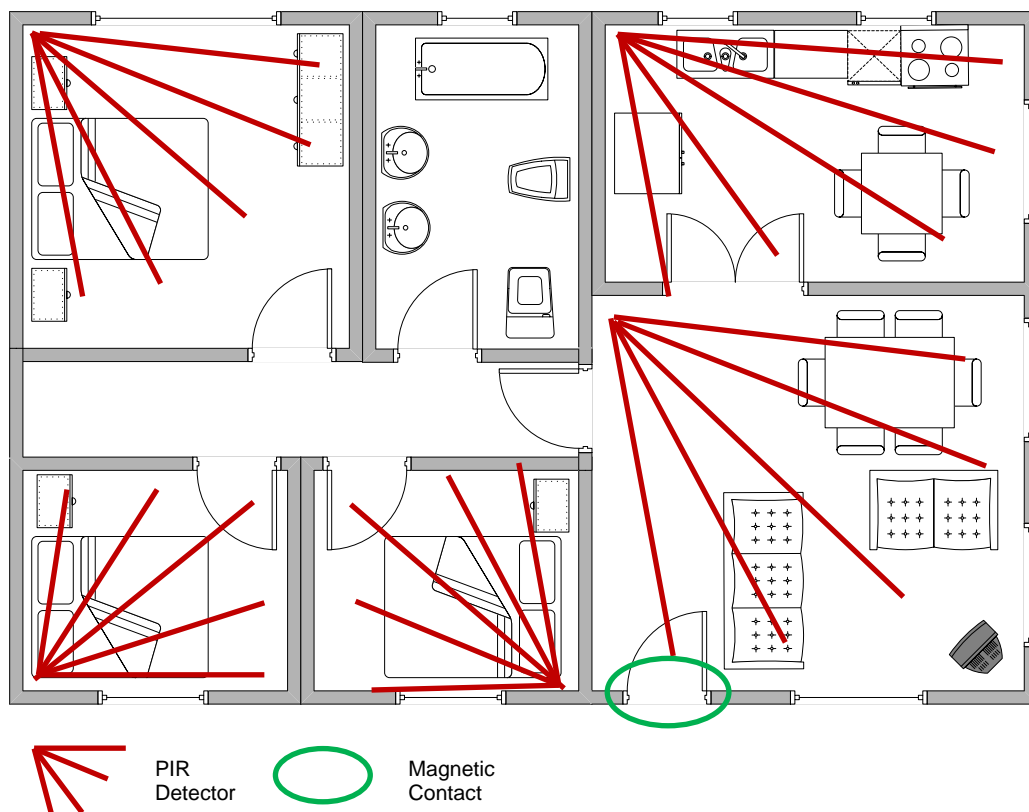
Fig 2.18 Private Home plan

The figure 2.18 shows location of the detectors, in the complete alarm system there are more devices present such as the alarm central, the keyboard and a siren. This installation could be completed in approximately 4 hours.

In table 2.1 the budget and bill of the material of a private installation is shown.

Table 2.1 Private Budget

Device	Model	Number	Cost (€)
Alarm Central	CC488 Solution Ultima 880 Control Panel	1	65,5
Keyboard	CP508LB LCD Codepad	1	24
PIR Detector	ISC-PDL1-WA18GB Professional Series TriTech + Detectors with Anti-mask	4	228
Magnetic Contact	ISN-CMICRO Ultra miniature Contact	1	14,5
Siren	ES991MA-ZT1	1	6,30
Cable (100m)	MapHF 6/22	1	26,43
	Total		**364,73**

The 364,73 euros is the cost of the components for the company bought directly from the manufacturer, these products have a discount of the 50% which is typical in this sector of business. It is important to take into account that the work hours of the technicians are not included in this budget.

The business plan followed in this example and in the other examples in order to give the final price to the customer is increasing the price of the material costs a 90%. Hence the price for this installation would be 692,99 euros.

- **Enterprises**

The security system used in the enterprises usually has more devices than the systems installed in a private home. In a typical enterprise we could have an alarm, fire alarm and CCTV system. Figure 2.19 gives an example of an installation in a small enterprise with an alarm and fire system.

PIR Detector

Magnetic Contact

Fire Detector
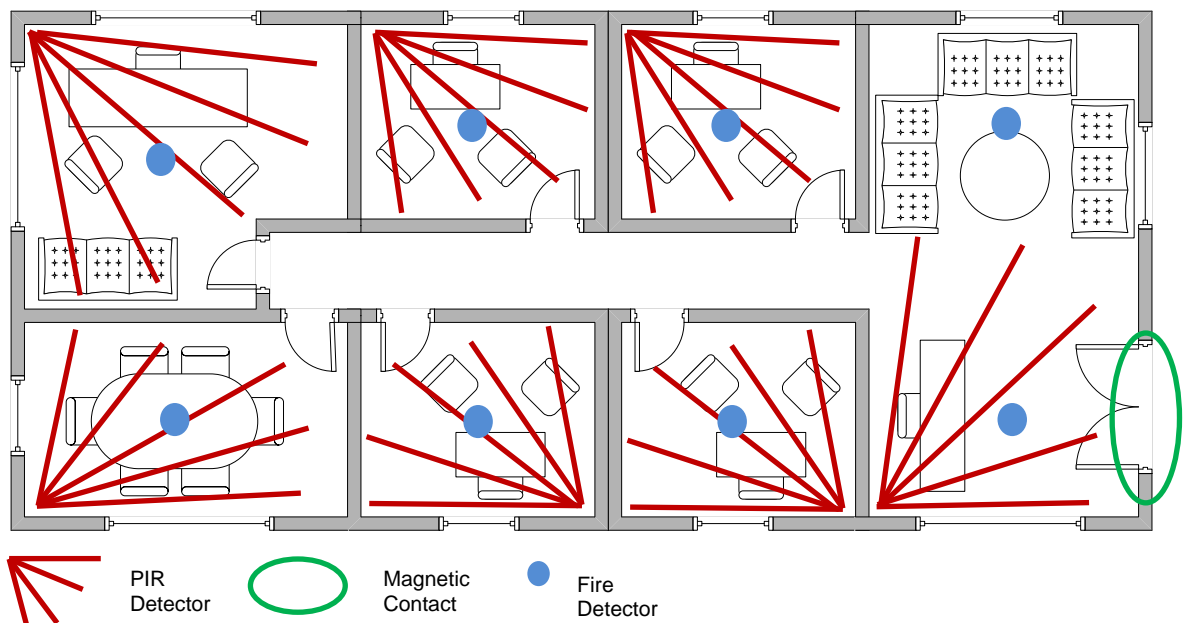
Fig 2.19 Enterprise plan

This installation is without a CCTV system. This deployment could be completed in approximately 6 hours.

The bill of material for this type of installation is shown in table 2.2. The costs are those provided by the device manufacturer with the according discount.

Table 2.2 Enterprise Budget

Device	Model	Number	Cost (€)
Alarm Central	CC488 Solution Ultima 880 Control Panel	1	65,5
Keyboard	CP508LB LCD Codepad	1	24
PIR Detector	ISC-PDL1-WA18GB Professional Series TriTech + Detectors with Anti-mask	7	399
Magnetic Contact	ISN-CMICRO Ultra miniature Contact	1	14,5
Siren	ES991MA-ZT1	1	6,30
Fire Central	DSC Conventional Fire Panel CFD4800	1	124,85
Optic Fire Detector	Z620-582	8	127,4
Call Point	ZC6-MCP-R	1	8,58
Fire siren	ZF-MES1-RBS	1	57,56
Cable (100m)	MapHF 6/22	2	52,86
		Total	**880,55**

This is the price offered by the manufacture with a 50% discount over its public catalog. Therefore, following our business plan described in the last example, the price for this installation would be 1673,05 euros.

- **Shops**

Shops usually have a similar system to the enterprises with an alarm system, fire system and CCTV system. Also, they can have special products to avoid pilfering.

An example of a system is shown in figure 2.20, with alarm fire and CCTV installed in a shop. In this case, the installation could need one day of working in order to deploy all the security system (eight hours).
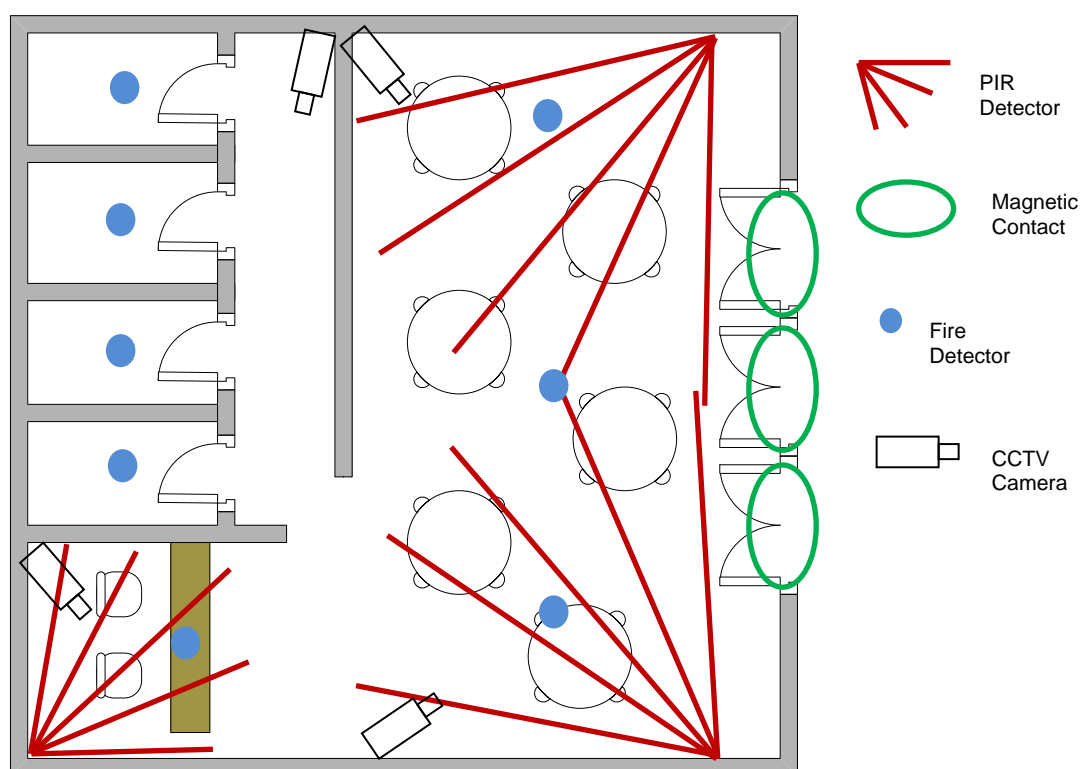
Fig 2.20 Shop plan

The last image 2.20 shows the map of the shop with the position of the detectors. The table 2.3 shows the cost of all the devices that would be used in the installation for the company.

Table 2.3 Shop Budget

Device	Model	Number	Cost (€)
Alarm Central	CC488 Solution Ultima 880 Control Panel	1	65,5
Keyboard	CP508LB LCD Codepad	1	24
PIR Detector	ISC-PDL1-WA18GB Professional Series TriTech + Detectors with Anti-mask	4	228
Magnetic Contact	ISN-CMICRO Ultra miniature Contact	3	43,5
Siren	ES991MA-ZT1	1	6,30
Fire Central	DSC Conventional Fire Panel CFD4800	1	124,85
Optic Fire Detector	Z620-582	8	127,4
Call Point	ZC6-MCP-R	2	17,16
Fire siren	ZF-MES1-RBS	2	115,12
Cable (100m)	MapHF 6/22	2	52,86
Recorder	DX-TL4U	1	598,5
Camera	ARD-982P	4	882,42
Coaxial Cable (100m)	RG-59 MIL	1	46,43
		Total	**2332,04**

All the devices installed in this example have a value of 2332,04 euros with the 50% of discount applied. This installation for a customer could cost 4430,88 euros.

- **Projects Plan**

These installations that are special because they have a high level of protection are named Projects Plan.

The figure 2.21 is an example of plan, is the same of the figure 2.18 but it has been increased the alarm system with more devices. In this case the example has incorporated a bigger alarm system and also a CCTV system.
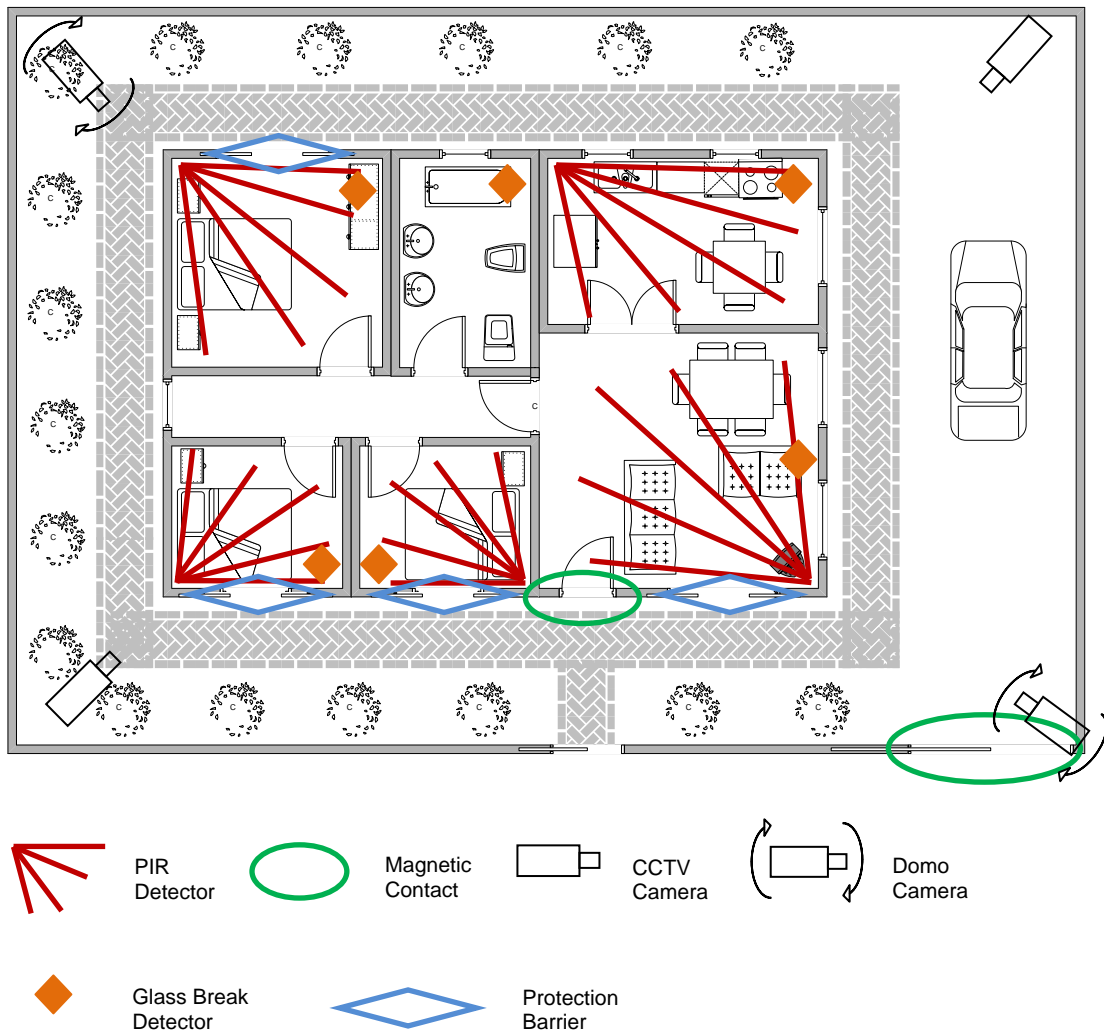
Fig 2.21 Project plan

For this installation it would be necessary more than one day of work. Approximately it could be the system installed in 10 hours.

The table 2.4, shows the budget and the bill of material used in the installation of the figure 2.21.

Table 2.4 Project plan Budget

Device	Model	Number	Cost (€)
Alarm Central	DS7240V2-SPA	1	100
Keyboard	DS7446KP-ES	1	52,75
PIR Detector	ISC-PDL1-WA18GB Professional Series TriTech + Detectors with Anti-mask	4	228
Magnetic Contact	ISN-CMICRO Ultra miniature Contact	2	29
Siren	ES991MA-ZT1	1	6,30
Glass Break	DS1101i	6	106,2
Protection Barrier	EL20RT/20	4	752
Cable (100m)	MapHF 6/22	3	79,29
Recorder	DX-TL4U	1	598,5
Camera	CSM-F50483	2	480,55
Domo camera	Legend Domo	2	3841,70
Keyboard	KT-405U	1	657,88
Coaxial Cable (100m)	RG-59 MIL	2	92,86
		Total	**7025,03**

In the last budget it has been necessary to change the alarm central and the keyboard because the central used in the other installations does not comply with the specifications of the installation at hand.

The budget of all the used components is of 7025,03 euros with a discount of the discount 50%. The final price for the customer would be 13347,56 euros.

2.3.   Conclusions

As it has been stated in the beginning of this chapter it is possible to assure that this market sector is growing, expanding and also is evolving. Every day, more security systems are being installed and new products are being developed to improve and adapt to the market needs of the future.

In the last points different products for the three different services offered by the up-start security company have been analyzed. These products are from different manufacturers but they have been selected based on their characteristics and by their reliability to avoid false alarms produced by external factors.

The working time for each type of installation has been estimated for the case when two technicians are working simultaneously.

CHAPTER 3. INDUSTRY STUDY

Before the start up of a business, it is important to perform a sector study in order to know what are the characteristics of the companies that are working in the same industry sector, in other words, study the competition.

Knowing these characteristics and the market share of these firms it is possible to have an idea about which would be the economical results of a new company working in the same sector.

The present chapter has the purpose of performing such a study about the market share of each company that will compete with us in the market and also to analyze the obtained data

3.1.   Industry Characteristics (SABI)

In order to study the industry characteristics a database called SABI (*Sistema de Análisis de Balances Ibéricos*) has been used. This database contains all the information of all the business economic plans in Spain and Portugal.

SABI provides an option called "advanced search" where it is possible to search for companies by the corresponding business sector codes. These codes are different depending on the activity of the company, in our case the used codes are related with the services described in Chapter 1.

The table 3.1 shows the codes used for the "advanced search" in order to obtain a list of companies for study and analysis.

Table 3.1 SABI codes

Code	Description
7382	Security system services
7460	*Servicios de investigación y seguridad*
8494	*Servicios de custodia, seguridad y protección*
5041	*Instalac. electricas, redes telegraficas, telefonicas, telef. sin hilos, TV*
9217	*Servicios de protección contra incendios y accidents*
4531	*Instalaciones electricas*

Some of the last codes are related with electrical and telephone line installations. It is important to add these codes to the search criteria given that the latter activities form the basis of the correct functioning of a security system.

SABI also provides boolean search in the "advanced search" section which has been used to find the companies which offer the same or similar services and would compete with us for market share. The Boolean search used with the codes of the table 3.1 is the next:

(7382 Y 7460 Y 8494 Y 5041) O (9217 Y 4531 Y 7382)

(3.1)

Using the last Boolean search the information of 145 firms have been obtained but, not all of these companies are adequate for our study since they offer services which will not be part of our business plan as a start-up, or ceased to exist or only old information of their accounts is available.

If the data for the searched firms is older than year 2006 it was removed from our list, leaving a total of 41 companies to proceed with our analysis.

Looking at each company, it is possible to find some firms that offer services that are not selected for the future of our company or they have the category of a multinational enterprise. If these subjects are eliminated from our search, the number of companies that have a similar profile as ours would be 21.

Although there are not many companies with a similar profile, it would be possible to obtain reliable results for our study of the industry sector.

3.2.   Analysis of the obtained results

The following graphs show the results of the study divided in different cases in order to analyze different aspects of the companies that are in the sector. The data used in the graphs is from the 2006 fiscal year (the last year that shows up in SABI).

In this section, we will also analyze the obtained results. With the data at hand it will be possible to have an estimated prediction of the possible future internal ratios of our company.

3.2.1 Economic Profitability

Indicates the half output obtained by a business from its investments in assets (before taxes). In other words, it can be defined as the efficiency using the assets.

Economic Profitability has been calculated using the following formula:

$$Economic\ Profitability = \frac{EBIT}{Total\ Assets}$$

(3.2)

The economic profitability of each company has been calculated with the latter equation, with results illustrated in figure 3.1. As observed, the variation of the obtained results (blue bars) and other interesting figures are also represented.
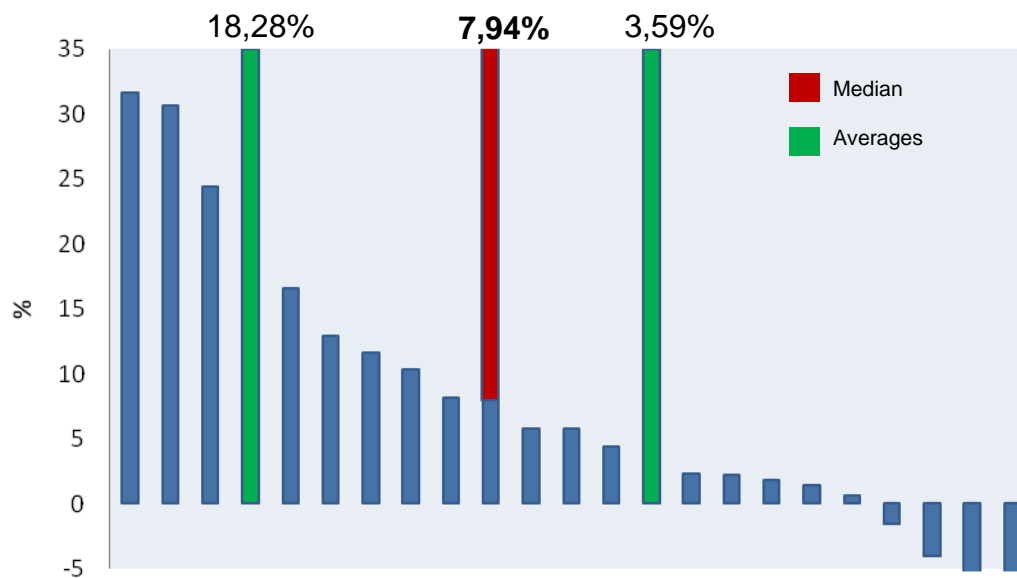
Fig 3.1 Economic Profitability

Red line represents the median value (excluding companies with negative value E.P.). The median has a value of 7,94% of profitability.

Using the median value, two different approximations of the possible economical profitability can be achieved: one optimistic and the other pessimistic. Both approximations are represented in the graph with the two green lines.

On one hand, for the calculation of the optimistic value the criteria is to obtain the superior average. In other words, the average of all the values between the highest value and the mean value. In this case, the obtained figure for the optimistic approximation is 18,28% of profitability.

On the other hand there is the pessimistic value, this value has been calculated doing the average between the mean value and all the values up to 0% of profitability. With this criteria, the resulting figure is 3,59% of economical profitability.

Since graph does not represent a constant value of E.P. We cannot extract a generic value determining the economic profitability of the industry.

3.2.2   Financial Profitability

This figure gives information about the half output obtained by the enterprise through its activity using its own funds. Also it is an expression of the output obtained by stockholders.

The figure is obtained using the following equation:

$$Financial\ Profitability = \frac{EBIT}{Stockholder's\ Equity}$$

(3.3)

The next figure 3.2 shows the obtained results from the formula 3.3 and the analysis of the financial probability applied to the 21 companies.
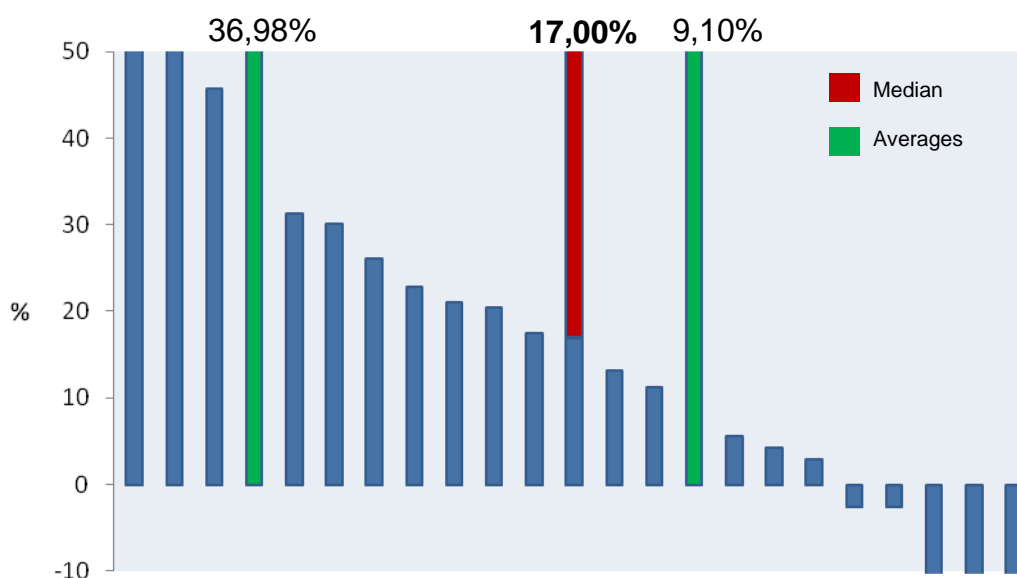
Fig 3.2 Financial Profitability

In this case the positive median (without negative values) of the financial profitability of all the enterprises analyzed is 17,00%.

The median is represented in figure 3.2 with the red line. Also, represented on the same bar figure are the optimistic and pessimistic approximations for this value in green bars. The optimistic approximation yields a 36,98% of financial profitability, this is a big increase over the value obtained from the median. This difference indicates a large number of companies have a financial profitability higher than the median obtained. The value of the pessimistic median however, yields 9,10% of financial profitability.

Like in the economical profitability, the figure is not constant over the different companies under analysis hence it is impossible to establish a percentage of financial profitability for this sector as a whole.

3.2.3 Liquidity

Liquidity Is the capability of the enterprise to pay its obligations. This figure is the difference between the current assets (the richness of the enterprise) and the short term liabilities (the debts that have to be paid in short term).

The equation used to calculate the Liquidity factor of the enterprises is the following:

$$Liquidity = \frac{Current\ Assets}{Short\ Term\ Liabilities}$$

(3.4)

With the last formula, the obtained results from the liquidity for each enterprise are noted in figure 3.3.
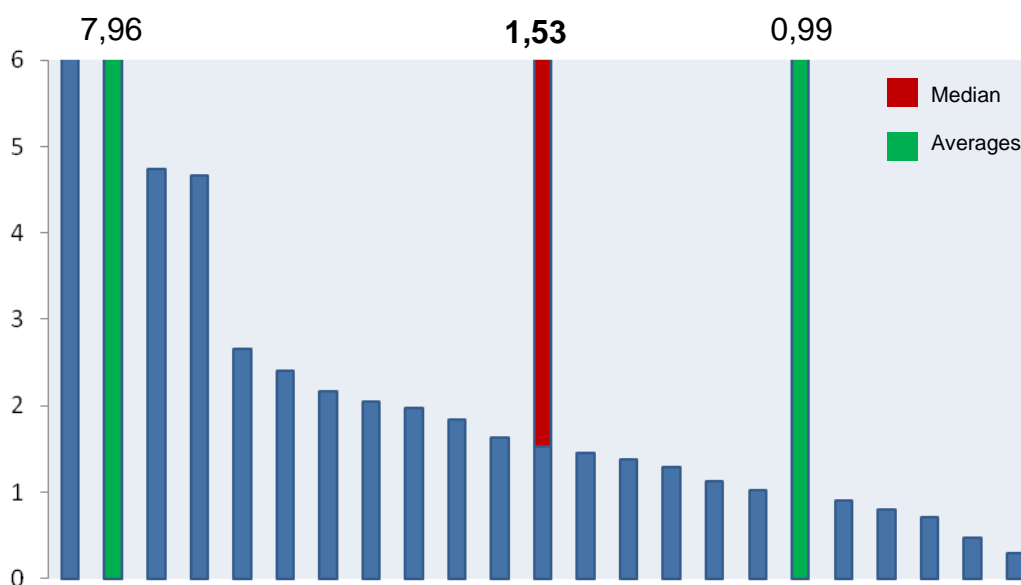
Fig 3.3 Liquidity

The obtained median (the red bar) for the liquidity is 1,53. This factor means that the enterprise has enough current assets to transform into money in order to pay its short term liabilities. If this factor was 1 it would mean that the current assets and the short term liabilities have the same value, in other words, it will be necessary to spend all the current assets in order to pay the short term liabilities.

An ideal theoretical value for liquidity is 2, this would mean that the current assets double the short term liabilities enabling the possibility of expansion for the company.

The figure 3.3 represents the same analysis as the previous sections. The result obtained with the average over the median is 7,96 meaning that there is approximately 8 times more current assets than short term liabilities.

The other average calculated under the median yields 0,99. With this result, the enterprise almost could not pay all its short term liabilities.

It is important to take into account that a high value of this ratio means less profitability of the enterprise because exists an excess of unused capital. A low ratio, on the other hand, means a high indebtedness.

3.2.4   Indebtedness

The indebtedness gives information about all the debts (short and long term figures). This ratio gives the volume of the debts in the liabilities.

Indebtedness is calculated using the following formula:

$$Indebtedness = \frac{Short\ Term + Long\ Term\ Liabilities}{Total\ Liabilities}$$

(3.5)

The obtained results using the last equation and the analysis represented in the graph 3.4:
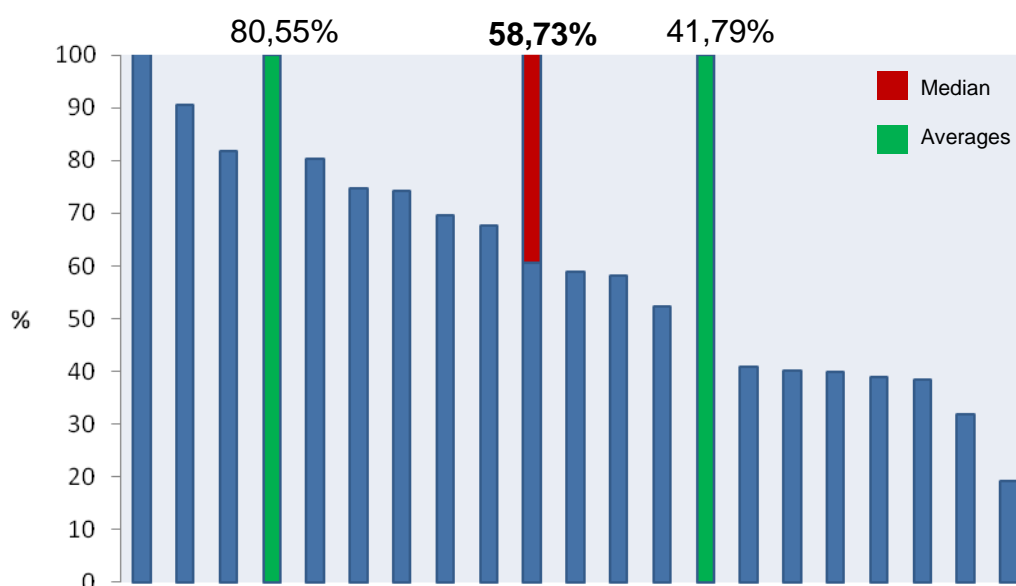
Fig 3.4 Indebtedness

Indebtedness is represented between the ratios 100% and 0%. An ideal considered value for the indebtedness is about 60%.

The calculated median with all the data of all the companies (red bar) has a value of 58,73% of indebtedness. This is a desirable figure taking into account that it is near the ideal value considered for indebtedness.

Having a median of 58,73%, two approximations have been calculated taking the lower and higher figures over the latter median represented in graph 3.4 with green bars. The first one has a value of 80,55% of indebtedness that has been obtained from the superior average between the maximum value of indebtedness and the median. The second one value is 41,79% that is

calculated with the inferior average between the media and the minimum value of indebtedness.

In this case, the better value for the indebtedness is the obtained in the median that is the more similar to the ideal, but it cannot be considered as the common value for the companies in this industry sector of business because the graph is varies depending on the company analyzed.

3.2.5   Productivity

Productivity can be defined as the benefits obtained by the business activity, in other words is the relation between the output from processes per unit of input.

In order to calculate the productivity the following formula has been used:

$$Productivity = 1 - \frac{Sales\ Material\ Cost + Personnel\ Costs}{Operating\ Revenues}$$

(3.6)

The results of the productivity analysis are represented in the graph 3.5:
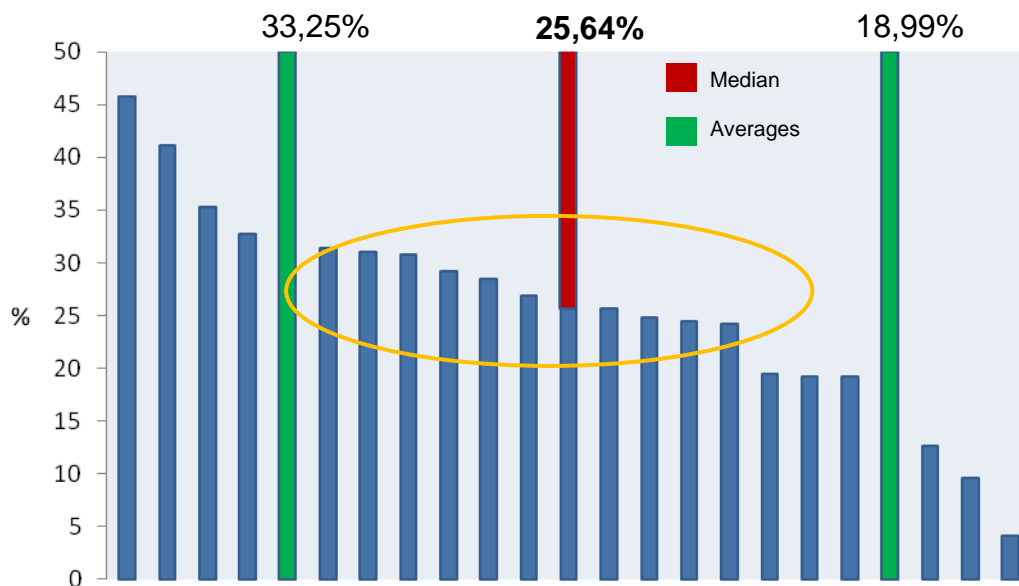
Fig 3.5 Productivity

The obtained median (red bar) has a value of 25,64%. This result means that after paying the material and personnel costs, 25,64% of the operating income remains as revenues. In other words, 25,64% of benefits are obtained from the business activity.

Green bars are two more approximations, one optimistic and the other one pessimistic. The optimistic approximation has been calculated doing the average between the maximum value of productivity and the calculated median. On the other hand, the pessimistic value has been extracted from the average between the median and the minimum value of productivity present in the companies analyzed.

Optimistic case has a value of 33,25% of productivity. This means that the enterprise in does not have to spend much in its business activity and therefore can achieve a high rate of productivity.

The pessimistic value is 18.99%. In this case the enterprise has some benefits but most of them are necessary to pay for the necessary spends for the business activity hence the productivity is lower.

Last graph is not constant at all so it is not possible to know a general value of productivity for all the industry. But it is possible to see a big group of companies with productivity between 30% and 25% approximately which gives a general idea of the economical position for this market industry.

3.2.6   Number of employees

With the number of employees is possible to grasp the size of the business approximately and their infrastructure. It is important to take into account that the graph only represents the number of employees that are hired by the companies, and that outsourced people do not appear in the graph.
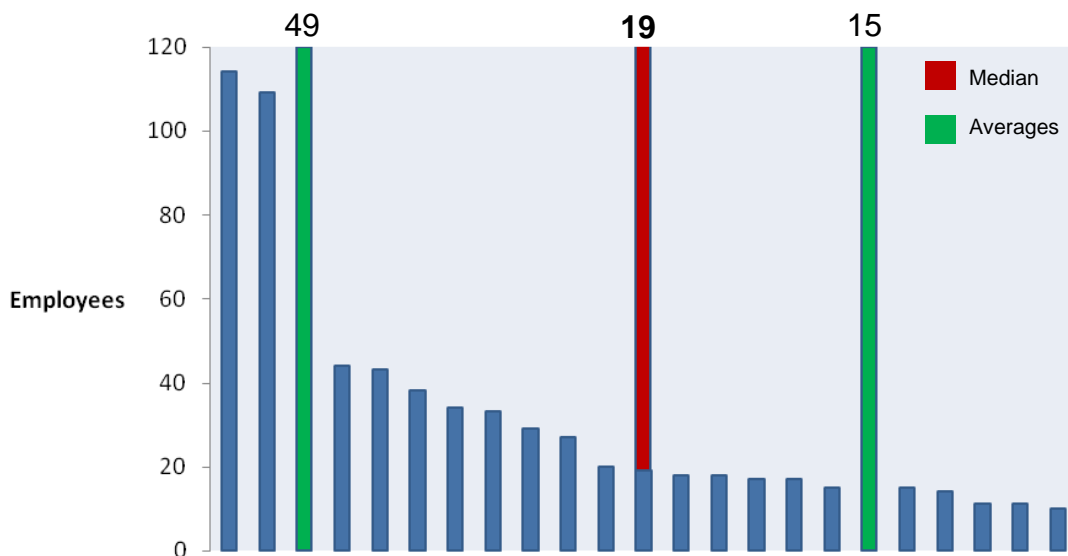
Fig 3.6 Employees

The median of employees is represented with the red bar and has a value of 19.

The first green bar with a value of 49 employees is an approximation calculated doing the superior average between the maximum number of employees and the median. The second one, with a value of 15 it has been obtained doing the average between the media and the minimum value of number of employees.

Having a high number of employees mean the possibility of do more work hence obtaining more benefits but, on the other hand, it implies more costs as to employee wages thus decreasing benefits.

3.2.7   Property and Equipment vs. Operating Revenues

This ratio gives us an idea about the general structure of the company, in other words, to know the volume of renting for the particular firm.

The figure is obtained applying the following formula (3.7) and the results represented on the graph below (Fig 3.7):

$$Property\ and\ Equipment\ VS\ Operating\ Revenues = \frac{Property\ and\ Equipment}{Operating\ Revenues}$$

(3.7)
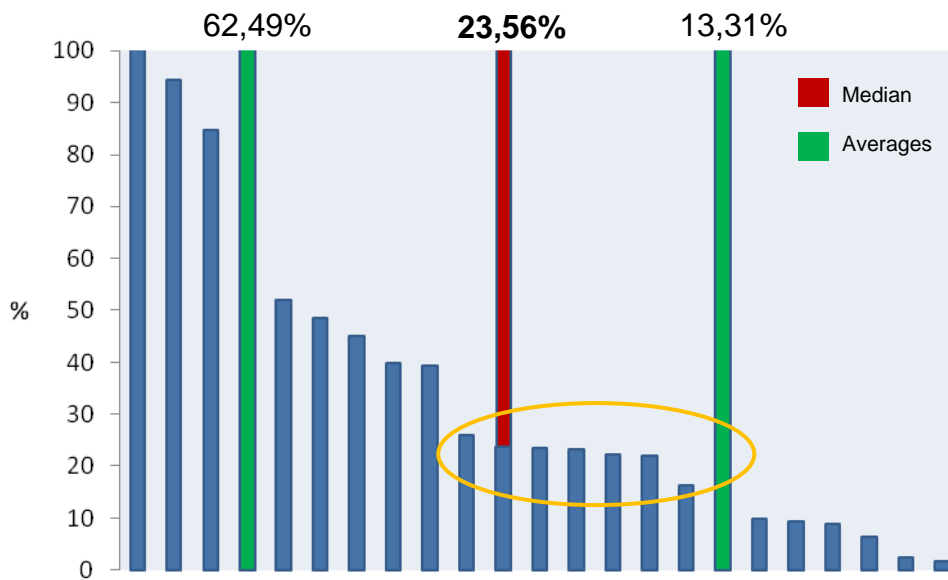
Fig 3.7 Property and Equipment vs. Operating Revenues

The median obtained in the study is 23,56% (red bar), this means that 23,56% of the Operating revenues are in the form of fixed assets, therefore the operating revenues are large part of the company.

If the ratio is low it means that the operating revenues are high regarding to fixed assets and then, probably, the company is paying the rent for part of the fixed assets. On the other hand, if this ratio is high it means that the operating revenues are low regarding to the fixed assets and then, the enterprise, probably is not renting any sort of property.

The two green bars are approximations done it from the median. The first green bar with a value of 62,49% shows the higher mean value, representing companies whom probably do not rent any property. The second figure of 13,31% represents the lower average, hence the enterprise, probably has more rented property.

Last graph is not constant, however there is a group of 7 firms that seem to share the same rate for this figure but it is not sufficient to estimate a general rate for this business sector.

3.2.8   Earnings Before Interests and Taxes (EBIT) versus Operating Revenues

EBIT versus operating revenues is a ratio that gives information about the performance of the enterprise. In other words, with this ratio is possible to know what the percentage of the operating revenues is before the interests and taxes.

The equation used for calculate this ratio is:

$$EBIT\ VS\ Operating\ Revenues = \frac{EBIT}{Operating\ Revenues}$$

(3.8)

The results of the equation are showed in the next graph and also the analysis.
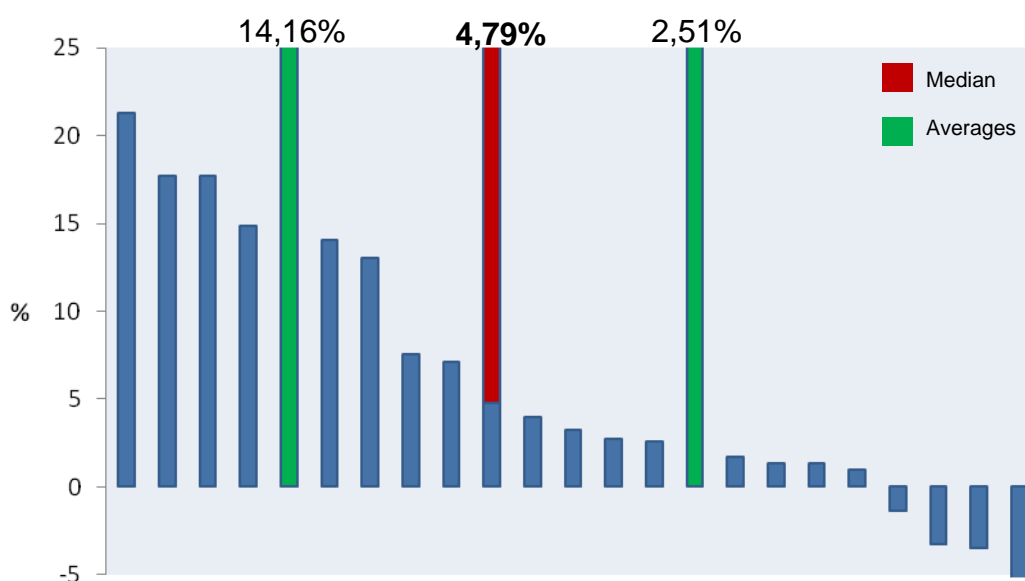
Fig 3.8 EBIT vs. Operating Revenues

The obtained median (excluding companies with negative rates) is 4,79 %, this result represents the percentage of the operating revenues before the interests and the taxes.

We can observe the higher average over the median with a value of 14,16%. The lower average over the median has a value of 2,51%.

3.2.9   Operating Revenues vs. Employees

This ratio gives the sales (operating revenues) per employee, the formula used is shown below (3.9) and the data represented in the graph 3.9:

$$Operating\ Revenues\ vs\ Employees = \frac{Operating\ Revenues}{Employees}$$

(3.9)
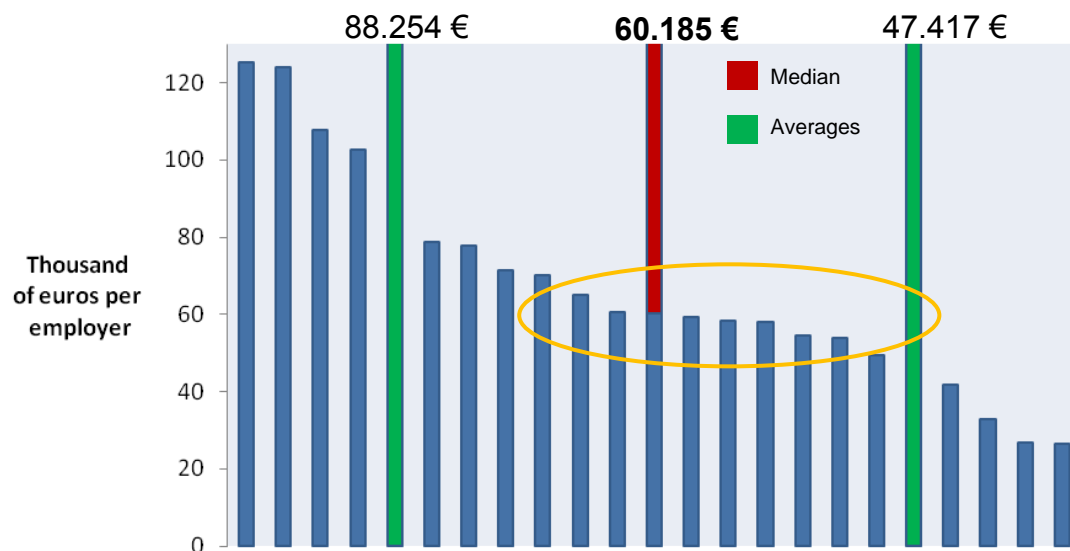
Fig 3.9 Operating Revenues vs. Employees

In the last figure 3.9 it is possible to see the median obtained of the operating revenues or the sales per employee. This median represented with the red bar has a value of 60.185 euros per employee. The lower and higher average over the median (green bars) are 47.417 euros and 88.254 euros respectively.

Although the graph is not constant and then it is not possible to determine general value, there are a little group of companies that seems to share revenues of around 60 thousand of euros per employee.

3.3.   Market Industry Study Conclusions

In this chapter the economical data from 21 companies obtained through SABI data base have been analyzed. These companies categorized through their specific activity codes have been analyzed one by one in order to determine their services and profile.

The existence of other companies in this same business industry sector dedicated to the same types of activities should be noted, but since they operate under adverse SABI activity codes not taken into account for this benchmark, no data is available from them. Despite operating in the same market industry.

CHAPTER 4. CHARACTERISTICS OF THE COMPANY TO BE CREATED

This chapter gives the information about the general characteristics, the target market, the internal structure and information about the workers.

4.1.   Market Target

The market target is composed by the products and the industry sector. Is important to taking in account both points in order to determine the characteristics of the company.

- **Products Target**

One of the basic premises of selection was to avoid wireless connectible devices. This is due to the expensive nature of wireless products as of market research (and proven by my own experience working in this field), and also have the handicap of producing more false alarms than the wired devices. Furthermore the wired devices are technologically more advanced since they do not have to compromise performance in favor of lowering energy consumption which is the case of battery powered devices.

The use of expensive devices has been avoided in the estimation of the budget in order to have a pessimistic approximation (expensive devices implies high revenues) of the company's economic and financial plan, which will be analyzed in chapter 5.

Another important point is the price that the installations cost. Considering the 50% discount that the company obtains from the manufacturer, and later increasing the price by 90% the client will end up paying less contracting the services of the company than buying the products by themselves (the clients do not have the 50% discount on the devices).

This latter is very important because the client will note that the price offered including the installation is lower than the price of all the components that are going to be installed and this is very attractive to the company's potential customers.

- **Industry sector target**

Table 4.1 summarizes the economical position for this market industry obtained in the Chapter 3:

Table 4.1 Summary

	Superior Average	**Media**	**Inferior Average**
Economic Profitability	13,08%	5,84%	2,05%
Financial Profitability	28,70%	11,48%	5,08%
Liquidity	7,96	1,53	0,99
Indebtedness	80,55%	58,73%	41,79%
Productivity	33,25%	25,64%	18,99%
Number of employees	49	19	15
Property and Equipment vs. Operating Revenues	62,49%	23,56%	13,31%
EBIT vs. Operating Revenues	14,16%	4,79%	2,51%
Operating Revenues vs. Employees	88.254 €	60.185 €	47.417 €

The target expected for the industry sector probably will have similar results as shown in table 4.1 because this data is extracted from the firms are working in the same industry sector and have the same profile (offer the same type of services) as the company that we are trying to start up.

About general results for the industry, it has not been possible to determine anything because there was no significant pattern between the different firms operating in the market. The industry studies were variable and the values depend on the position of the company.

In the Annex D, all these results will be compared with the results obtained from our company.

4.2.   Internal Structure

The internal structure of the company will be composed of 27 persons in its start-up. The employees will be teamed up and divided into different departments with different purposes.

The next image 4.1 illustrates the internal departments of the company:
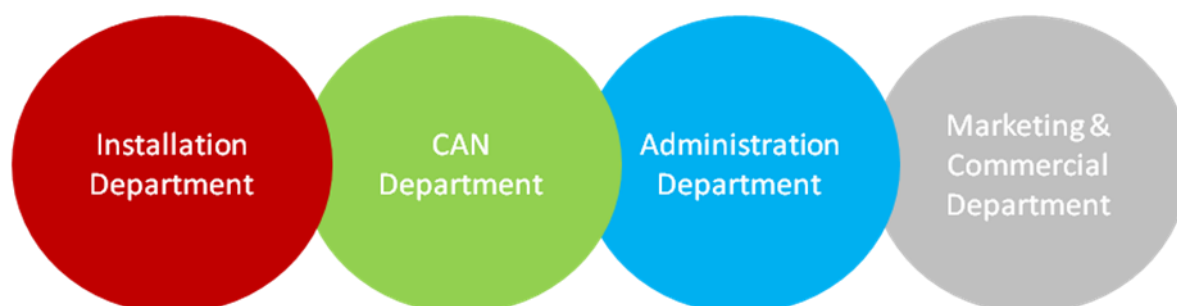
Fig 4.1 Internal departments

As showed in the figure 4.1, the company is divided in four department with its own functionality explained in the following points:

- Installations Department

The installation department has the responsibility of managing all the issues related with the installations, the reparations and the possible revisions.

- CAN Department

The main objective of the Central Alarm Node department is control all the received signals from the alarm centrals (alarm, emergency or test) and respond to them adequately.

- Administration Department

The Administration department is in charge of all the accounting of the company.

- Marketing & Commercial Department

This department is in charge of all the marketing and commercial activities and has the purpose of capturing clients and obtaining publicity for the firm.

The internal structure is a tree hierarchy where different departments have their own managers and these have ultimately a responsible person in charge. This type of company structure is very common among small and medium size businesses.

The figure 4.2 shows the internal structure of the company given the qualifications of the personnel.
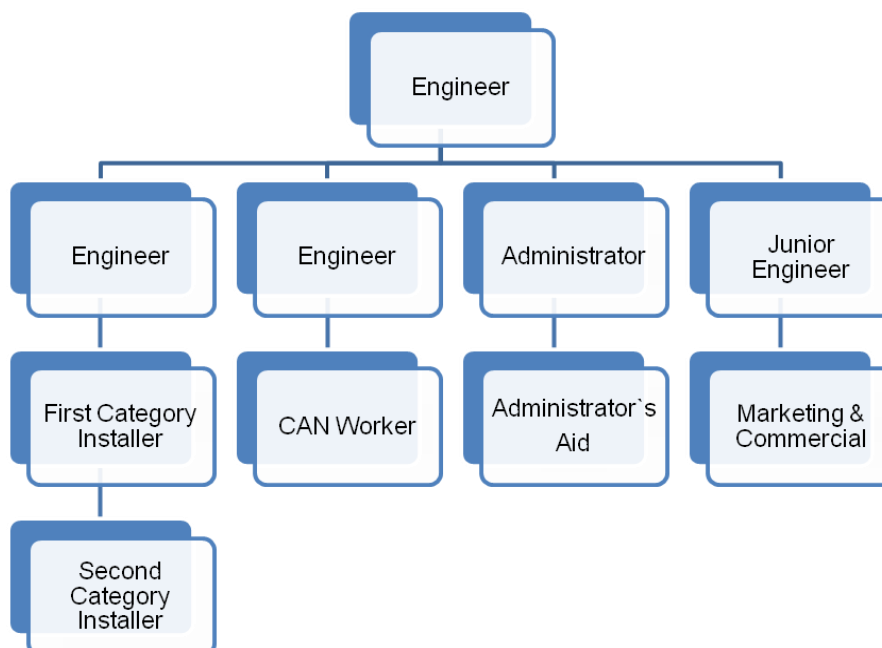
Fig 4.2 Enterprise structure

4.3.   Workers

In this section we would detail the necessary information related with the personnel such as number of employees per department and their salaries. Their profile is detailed in the Annex B

4.2.1   Number of workers

During the previous sections we discussed the internal structure and the number of employees that the company would be comprised by as a start-up. Here we will explain the workers distribution and the expected staff size during the company's first three years of activity.

The table 4.2 shows the staff prevision for the company:

Table 4.2 Staff Prevision

	2009	2010	2011
Engineers	3	3	3
Junior Engineer	2	3	3
First Category Installer	4	5	6
Second Category Installer	4	5	6
CAN workers	10	10	10
Administrator	1	1	1
Administrator's aid	1	1	1
Marketing and Commercial	2	2	3
TOTAL	**27**	**30**	**33**

The number of engineers, CAN operators, administrator and administrator's aid is constant during the first years. On the other hand, the number of junior engineers, installation technicians and marketing and commercial workers increases because they work is related with the volume of the company's business.

The criteria followed to calculate the number of installation technicians and CAN operators in relationship with the amount of business activity is done it in the Annex B.

4.2.2   Salaries

The wages of the workers are divided in fourteen annual payments. The table 4.3 shows information about the salaries of each type of employee and the cost it represents for the company in during the first year.

Table 4.3 Employee Salaries

	Monthly Salary (euros)	Monthly Salary Cost for the company (euros)	Annual Salary (euros)	Annual Salary Cost for the company (euros)
Engineer	2.500	3.848,54	35.000	46.182,50
Junior engineer	2.000	3.078,83	28.000	36.946,00
First Category Installer	1.900	2.924,89	26.600	35.098,70
Second Category Installer	1.800	2.770,95	25.200	33.251,40
CAN worker	1.800	2.770,95	25.200	33.251,40
Administrator	1.700	2.617,01	23.800	31.404,10
Administrator's aid	1.600	2.463,07	22.400	29.556,80
Marketing and Commercial	1.700	2.617,01	23.800	31.404,10
TOTAL	**15.000**	**23.091,25**	**210.000**	**277.095**

The difference between the salary of the workers and the cost of the enterprise is due to the costs of the social security. In this case, the percentage of cost applied is 31,95%.

These salaries will be increased the 4% in the second year and in the third year the 5% as an approximation to the IPC.

4.4.   Enterprise Expansion

The company must start its activity in a big metropolitan area with a large market base, for example Barcelona. Barcelona is located in Catalonia where a large number of people and industries are present. *Hospitalet de Llobregat, Barcelona* and *Badalona* are the three municipal terms (towns) with a high value of population density in the region (*Hospitalet de Llobregat* = 20.246 hab/km², *Barcelona* = 15.730,87 hab/km² and *Badalona* = 9.844 hab/km²) according to the data of 2007 offered by the *Instituto Nacional de Estadística* (INE). About industry, Catalonia is the Spain autonomous region with a high number of active companies which concentrate the 18,3% of the Spanish companies (626.020 companies according to the data of 2007 offered by the INE).

Starting the company activity in the province of Barcelona, could be possible to offer the services of the company to these three municipal terms and also to all the other smaller municipal terms of Barcelona. As an exception the Projects Plan installation could be offered to all the Spain communities due to the big earnings that these produce.

When the services offered have expanded throughout Barcelona it would be a good time to offer more services, like guard services, and also the time of install another headquarter in another community like Madrid which is the seventh municipal term in figures of population density (5.198 hab/km²) and the third autonomous region in number of active companies (519.307 companies which represents the 15,2% of the Spanish companies).

The goal is to grow little by little and to expand the area of business activity of within the national boundaries.

CHAPTER 5. ECONOMIC & FINANCIAL PLAN

The economical and financial plan is covered this chapter, for more information consult the Annex C.

5.1.   Incomes

The company receives incomes from two different sources. On one hand from the sales of security installations and on the other hand from the CAN connections.

5.1.1   Sales

Every new security installation is considered a sale. The four types of clients and the four types of products that are going to be sold have been defined in Chapter 2. Therefore, knowing the number of installations of each type and the cost of each installation it is possible to know what the income sales are.

In the table 5.1 the expected sales of each type of product for the first year are estimated. During the first month there are not many expected sale in order to achieve a pessimistic approximations for the expected sales. Also, the table shows the average of installations per day.

Table 5.1 Number of sales

	January	February	March	April	May	June	July	August	September	October	November	December
Private	0,00	20,00	20,00	23,00	24,00	26,00	27,00	30,00	33,00	34,00	36,00	39,00
Enterprise	0,00	12,00	12,00	12,00	15,00	15,00	16,00	16,00	16,00	17,00	18,00	20,00
Store	0,00	8,00	10,00	10,00	10,00	12,00	12,00	13,00	14,00	14,00	14,00	15,00
Project	0,00	1,00	1,00	1,00	1,00	2,00	2,00	2,00	2,00	3,00	3,00	3,00
TOTAL	0,00	41,00	43,00	46,00	50,00	55,00	57,00	61,00	65,00	68,00	71,00	77,00
Inst/day (20)	0,00	2,05	2,15	2,30	2,50	2,75	2,85	3,05	3,25	3,40	3,55	3,85

The estimates for the second year sales is done increasing 1,5% the number of sales from December of the first year every month. The monthly increase of the second year is 2%. The next table 5.2 shows the number of sales on December for the three years.

Table 5.2 December sales

	2009	2010	2011
Private	39,00	46,63	59,14
Enterprise	20,00	23,91	30,33
Store	15,00	17,93	22,74
Project	3,00	3,59	4,55

TOTAL	77,00	92,06	116,76
Inst/day (20)	3,85	4,60	5,84

In the table 5.2 it is possible to observe the average of installations per day (twenty days per month) for December. Using the same information the number of workers has been calculated in the Annex B.

Knowing the sales and the price of each product is possible to calculate the incomes of the company from the sales. The table 5.3 shows the sales income for the first three years.

Table 5.3 Incomes of sales

	Sale price	First Year	Second Year	Third Year
Private	692,99	216.211,94	357.745,08	442.057,56
Enterprise	1.673,05	282.744,61	442.916,23	547.301,64
Store	4.430,88	584.875,63	879.761,26	1.087.101,22
Project	13.347,56	280.298,70	530.038,01	654.956,06
	TOTAL	**1.364.130,88**	**2.210.460,59**	**2.731.416,49**

The prices of the sales have been maintained invariable for this analysis during the three year analysis period. If it was necessary it could be increased in order to improve the results of accounting.

5.1.2   CAN Connections

The customer of each installation is connected to the Central Alarm Node and must pay a subscription for the CAN services. The subscription will cost 20 euros the first year, 25 euros the second year and 30 euros the third year.

In order to be more realistic, after the third month the number of CAN connections will decrease by 1%. Therefore, each CAN customer will be connected 100 months, in other words, eight years and four months.

In the table 5.4 the CAN connection at the end of the year and also all the incomes of that year are shown.

Table 5.4 CAN annual connections and total incomes

	2009	2010	2011
Number of Connections	596,00	1.522,00	2.571,00
Year Incomes	65.060,00	334.075,00	755.490,00

5.2.   Costs

Three different types of costs can be identified in the company: the initial costs (related with the start-up), the fixed costs and the variable costs.

5.2.1.   Initial Costs

The initial capital, is the capital necessary to start-up the business. These are the first expenses of the company before the fixed and the variable costs derived from the activity.

The table 5.5 shows the initial costs for the start-up of the company:

Table 5.5 Initial Costs

Initial Costs	
Warehouse	300.000 €
Warehouse Recondition	60.000 €
Furniture	6.000 €
Computer Equipment	3.000 €
Computer Applications	1.000 €
CAN conditioning	30.000 €
CAN equipment	30.000 €
Permission Taxes	700 €
Warranty Deposit	240.404,84 €
Policy of Civil Responsibility	5.000 €
Stock	3.000 €
Notary Procedure	2.000 €
Cars (10.000€) x 6	60.000 €
Installers equipment (600) x 8	4.800 €
TOTAL	**745.904,84 €**

A warehouse is a good place as a location for the company. In this case, it has been found an 1800m^2 warehouse *Sant Boi de Llobregat* that probably must be reconditioned and furnished. Other expenses will be the electronic equipment like the computers and productivity software for working. Also it will be necessary to construct a bunker for the accommodation of the CAN and it's equipment.

Other expenses are the cars for the transportation of the workers (installation technicians, engineers and marketing & commercial personnel) and also the equipment of the installation technicians.

The constitution of the company and the expenses of the notary also are part of the initial costs.

Due to the activity of the company, abiding the laws and regulations, it is necessary to pay special taxes (for the authorization of the activity) and also to have a deposit as a warranty in disposition of the sanctioning authority (stipulated in the *Real Decreto 4/2008*).

An approximation of the Policy of Civil Responsibility has been done by asking for the policy of another private security company. During the project, it has not been possible to contact an insurance company and ask for a budget over the civil responsibility policy contract. The contracted Policy has a value of 450.000 euros and is fixed according the activities of the company and also it is compulsory by the "*Reglamento de Seguridad Privada*".

5.2.2. Fixed Costs

These are the expenses of the company that must be paid every month. The table 5.6 shows a summary of all the fixed costs that the company has to pay monthly during the first year.

Table 5.6 Monthly Fixed Costs of the first year

Fixed Costs	
Workers Salary	84.667,92 €
Generic Expenses (light, phone, adsl)	300 €
Cars fuel & maintenance(300x6)	1.800 €
Office equipment	80 €
Equipment maintenance	100 €
Marketing expenses	2000 €
Civil Responsibility Policy (5.000/12)	420 €
Others	100 €
Loan	4.166,67 €
Loan interests	333,33 €
Total Fixed Costs	**93.967,92 €**

Some of these expenses will increase in the following years because it will be necessary to buy more cars, to hire more workers and also the salaries will increase, etc. On the other hand some costs such as the loan payments and the loan interests will disappear.

5.2.3. Variable Costs

These costs are related with the sales of the company and change every month. Table 5.7 shows the monthly variable cost for each type of sale.

Table 5.7 Variable Costs

Variable Costs	
Private	364,73 €
Enterprises	880,55 €
Shops	2332,04 €
Projects Plan	7025,03 €
Marketing Commissions	5% of the income sale

The last costs shown in table 5.7 are extracted from the chapter 2 where a typical installation of each type has been simulated. In reality, these costs can change because each installation of each type can have more or less devices depending on the decisions of the client.

The marketing commissions are given to the construction companies for the clients obtained through them. The first year is expected that the 75% of the company sales are going to be through construction companies. In the second and third year, as a result of the activities of the marketing department, this percentage will decrease and it has been set to 66% of the sales of the second year and 62,5% for the third year. A high value of these percentages represents high marketing commission's costs.

5.3. Financial Plan

The Income Statement, the Cash Flow and the Balance are detailed In the Financial Plan. Furthermore the Loans and the TIR analysis are also explained.

5.3.1. Income Statement

The table 5.8 shows the income statement for the first three years.

Table 5.8 Income Statement

	2009	2010	2011
	First Year	**Second Year**	**Third Year**
Incomes	1.429.190,88	2.544.535,59	3.486.906,49
Sales	769.246,74	1.237.082,33	1.522.944,39
Gross Margin	659.944,14	1.307.453,26	1.963.962,10
Fixed Costs			
workers	1.016.015,00	1.204.587,38	1.388.401,89
Marketing	24.000,00	24.000,00	24.000,00
Bills	3.600,00	3.900,00	4.200,00
Loan interest	4.000,00	4.000,00	4.000,00

Other expn.	30.000,00	37.200,00	40.800,00
EBITD (BAAIT)	-417.670,86	33.765,87	502.560,21
Depreciation	30.100,00	31.100,00	32.100,00
EBIT (BAIT)	-447.770,86	2.665,87	470.460,21
Taxes	0,00	799,76	141.138,06
Net Income	**-447.770,86**	**1.866,11**	**329.322,15**

As it can be observed in the last table 5.8, although the second year the net income is positive, the total Net income in these three years (the sum) is not positive. If we consider the results of the fourth year to be like the third, then the net income of the company will start to be positive.

5.3.2.   Cash Flow

The Cash Flow also named treasury projection is showed in table 5.9. It is possible to see that in the second year, due to the accumulated expenses and to the sales that are not enough, the annual Cash flow is negative (there are more payments than collections). In any case, the accumulated Cash flow still yields a positive value.

Table 5.9 Cash Flow

	2009	2010	2011
Collections			
Private	216.211,94	357.745,08	442.057,56
Enterprise	282.744,61	442.916,23	547.301,64
Store	584.875,63	879.761,26	1.087.101,22
Project	280.298,70	530.038,01	654.956,06
Clients	65.060,00	334.075,00	755.490,00
Bank Loan	300.000,00	0,00	0,00
Contributed Capital	1.000.000,00	0,00	0,00
Total Collections	**2.729.190,88**	**2.544.535,59**	**3.486.906,49**

	2009	2010	2011
Payments			
Warehouse	300.000,00	0,00	0,00
Warehouse Recondition	60.000,00	0,00	0,00
Furniture	6.000,00	0,00	0,00
Computer Equipment	3.000,00	0,00	0,00
Computer Applications	1.000,00	0,00	0,00
CAN conditioning	30.000,00	0,00	0,00
CAN equipment	30.000,00	0,00	0,00
Permissions	700,00	0,00	0,00
Warranty Deposit	240.404,84	0,00	0,00

Stock	3.000,00	0,00	0,00
Notary Procedure	2.000,00	0,00	0,00
Policy of Civil Responsibility	5.000,00	5.000,00	5.000,00
Marketing General Expenses	24.000,00	24.000,00	24.000,00
Workers Salary	1.016.015,00	1.204.587,38	1.388.401,89
Generic Expenses	3.600,00	3.900,00	4.200,00
Other expenses	25.000,00	32.200,00	35.800,00
Marketing Commissions	51.283,12	73682,01954	85.356,77
Private	113.795,76	188.286,89	232.661,87
Enterprise	148.812,95	233.113,81	288.053,49
Store	307.829,28	463.032,24	572.158,54
Project	147.525,63	278.967,38	344.713,72
Loan interests	4.000,00	4.000,00	4.000,00
Loans	50.000,00	50.000,00	50.000,00
Cars (10.000€)	60.000,00	20.000,00	10.000,00
Installers equipment (600€)	4.800,00	1.200,00	1.200,00
TAXES	0,00	799,76	141.138,06
Total Payments	**2.637.766,58**	**2.582.769,47**	**3.186.684,34**
Annual Cash-flow	**91.424,30**	**-38.233,89**	**300.222,15**
Accumulated Cash-flow	**91.424,30**	**53.190,41**	**353.412,56**

About collections of the first year, it is possible to see the capital introduced in the start-up composed by a bank loan (300.000 euros) and by the contributed capital (1.000.000 euros).

Another interesting point is the income obtained by selling the Store product, even though it comprises a small amount of the sales, nevertheless is the most profitable.

In the payments section, it is possible to see what are the payments made by the company and also its investments. As an example it is possible to see that in the second year the company buys two more cars and two sets of equipments for the two newly hired installations technicians.

5.3.3. Balance Sheet

The Balance Sheet it has been done it taking in account that the company starts its activity the 2nd of January 2009. Also the same day it receives the bank loan.

Table 5.10 Balance Sheet

ASSETS	2009	2010	2011
CURRENT ASSETS			
Stock	3.000,00	3.000,00	3.000,00
Cash	91.424,30	53.190,41	353.412,56
TOTAL	94.424,30	56.190,41	356.412,56
PROPERTY AND EQUIPMENT			
start-up	92.700,00	92.700,00	92.700,00
Fixed Assets			
Warehouse	300.000,00	300.000,00	300.000,00
Furniture	6.000,00	6.000,00	6.000,00
Cars	60.000,00	80.000,00	90.000,00
Installers equipment	4.800,00	6.000,00	7.200,00
Computers	3.000,00	3.000,00	3.000,00
CAN equipment	30.000,00	30.000,00	30.000,00
Depreciation	-30.100,00	-61.200,00	-93.300,00
TOTAL	373.700,00	363.800,00	342.900,00
Intangible Assets			
Software	1.000,00	1.000,00	1.000,00
Deposit	240.404,84	240.404,84	240.404,84
TOTAL	241.404,84	241.404,84	241.404,84
TOTAL ASSETS	**802.229,14**	**754.095,25**	**1.033.417,40**

LIABILITIES	2009	2010	2011
Stockholder's Equity			
Social Capital	1.000.000,00	1.000.000,00	1.000.000,00
Negative previous year		-447.770,86	-445.904,75
Income Statement	-447.770,86	1.866,11	329.322,15
Reserves	0,00	0,00	0,00
TOTAL	552.229,14	554.095,25	883.417,40
Long Term Liabilities			
Loan	200.000,00	150.000,00	100.000,00
TOTAL	200.000,00	150.000,00	100.000,00
Short Term Liabilities			
Loan	50.000,00	50.000,00	50.000,00
TOTAL	50.000,00	50.000,00	50.000,00
TOTAL	**802.229,14**	**754.095,25**	**1.033.417,40**

In the Assets section of the table it is possible to see how the Property and Equipment is higher than the current assets due to the inversion in fixed assets needed for the start-up of the company and the intangible assets where the compulsory warranty deposit is.

In the liabilities section, during the first three years there are no reserves, it would be necessary two years more with the same income statement to mitigate the negative results from the previous year and to obtain reserves. In

the long and short term liabilities only is the bank loan, there are no debts to manufacturers because the material would be paid for when it is bought.

5.3.4.   Bank Loan

During the start-up of the company a bank loan has been contracted in order to reduce the contributed capital. The value of this loan is 300.000 € with an interest of the 8%.

This loan will be paid in 6 years, hence each year it will be necessary to pay 50.000 euros plus interests (4.000 euros per year).

5.3.5.   TIR Analysis

One good indicator to see if the inversion is more or less profitable is the TIR. This indicator allows to know the interest of the investment during an amount of years. It is calculated from the Financial Cash Flow which is the Net income plus the Deprecation.

If we calculate the TIR for the first 10 years of activity (considering that from the third year the company is not growing, in other words, the value of the net income plus the depreciation is the same) we obtain **14,49%** of TIR that is a good rate.

5.4.   Results Analysis

5.4.1.   Break-Even Point

The break-even point is the neutral point where the incomes higher than the expenses. Next there are two different graphs that calculate the break-even point for the business activity.

5.4.1.1.   Accumulated

Here the break-even point is calculated using the accumulated expenses and the accumulated incomes of all the months that the company has been working.

The following figure 5.1 shows the obtained result:
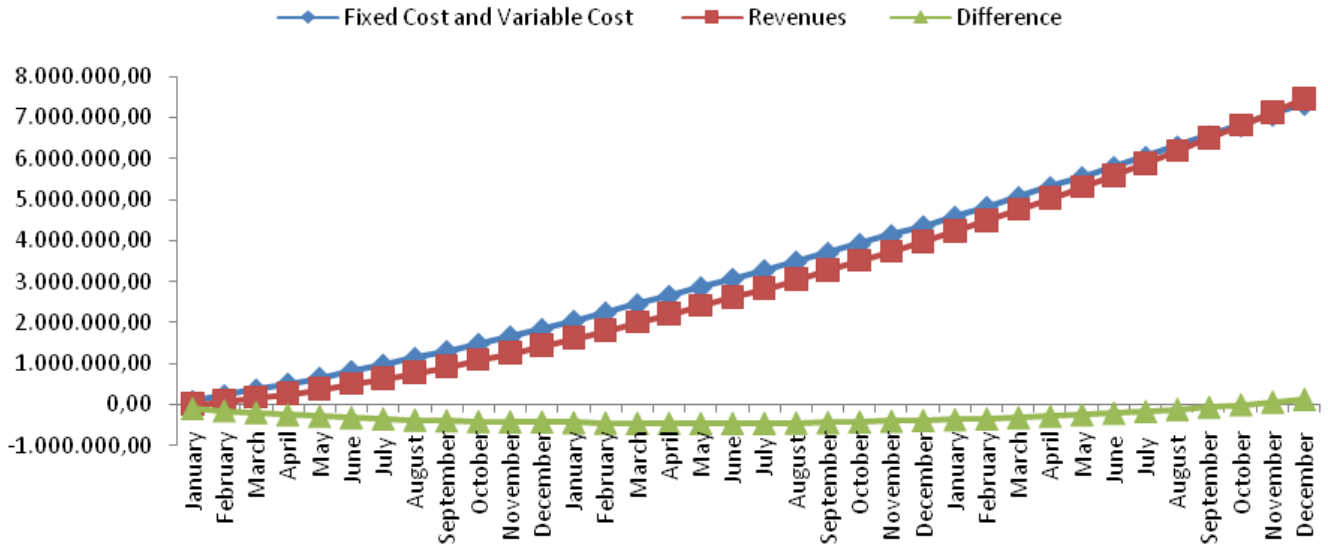
Fig 5.1 Break-Even Point

In the graph of figure 5.1 it is possible to observe how the company till October of the third year the accumulated expenses of are higher than the incomes and so the company is not making any profit until that period.

5.4.1.2.   Not Accumulated

In this case the break-even point is obtained over the monthly expenses and incomes.
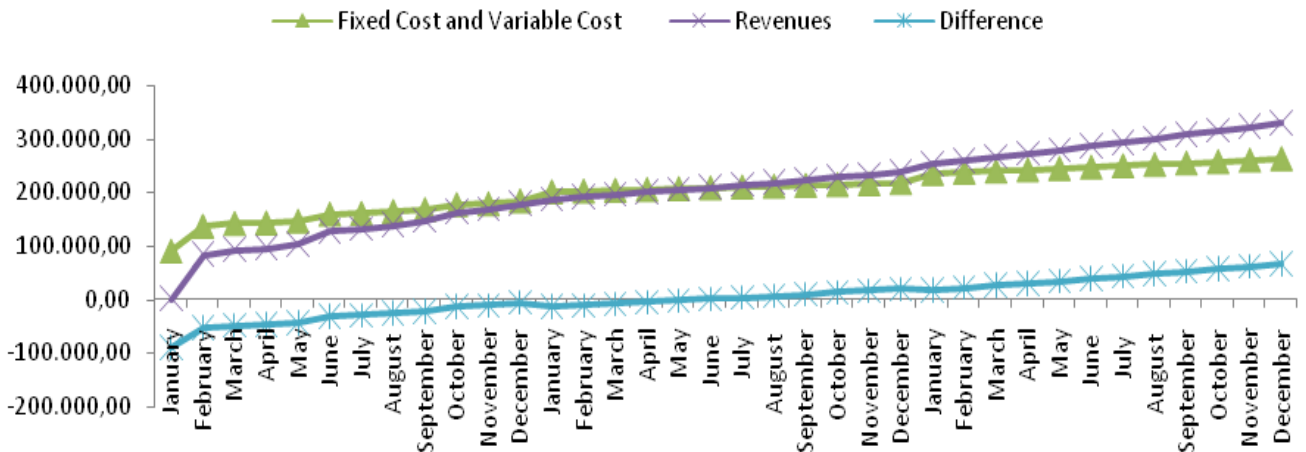
Fig 5.2 Break-Even Point

In this case, starting at June of the second year the revenues are higher than the costs. Furthermore no revenues are obtained during the first year, this being the important reason of the necessity for high capital contribution.

5.4.2. Inversion Recover

The graph in figure 5.3 illustrates the evolution of the contributed capital investments:
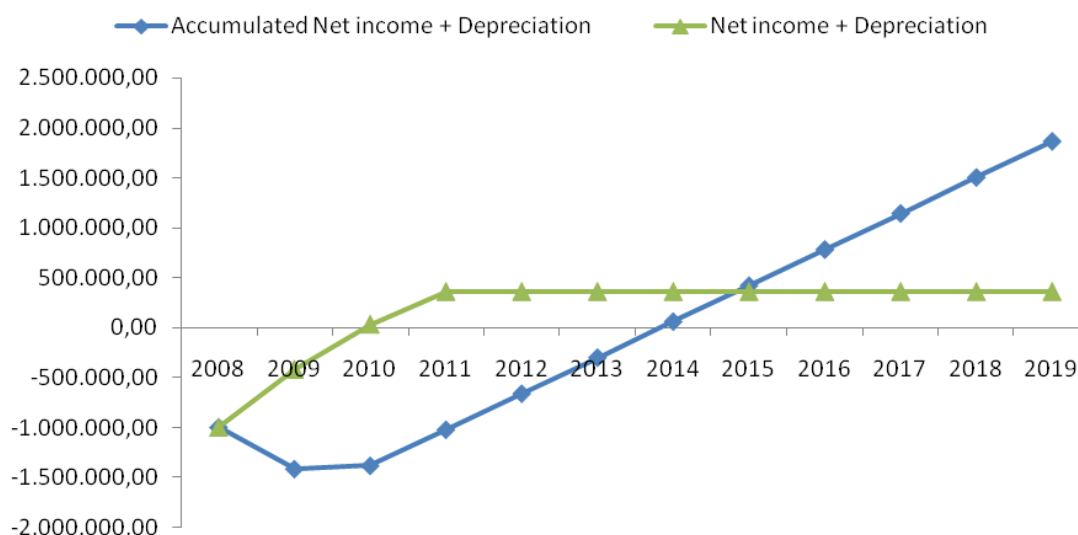
Fig 5.3 Inversion

As observed in the figure, by 2014 the accumulated net income + depreciation starts to have a positive rate including TIR. This approximation has been done by taking into account that the company will not growing since the third year (as represented by the green line).

5.4.3. Comparison Analysis

In chapter 3 we analyzed the companies competing for the same market industry sector. In the Annex D we will compare our estimate economical and financial plan with the latter companies.

Note that the data available for comparison dates prior to year 2006 and our estimates concerning our company consists estimates from the year 2009.

CHAPTER 6. CONCLUSIONS

The following conclusions have been asserted during the realization of this project

1. In today's world, where the use of security installations is compulsory by law in many locations and also the increase in demand on behalf of everyday people, there exists a big market opportunity for the foundations of security companies in the western world.

2. A large variety of security devices are available in the market, each having special characteristics of their own. These products are evolving fast and improving their detection technology.

3. Barcelona represents a good market opportunity to start a security company due to its high population and high industrial activity.

4. The sale prices of the products in the market are very competitive. It is cheaper for the people to contract the services of a security company than buy the devices themselves.

5. A tree structure has been devised for the company dividing it in deferent departments with their own purposes. The staff dimension has been calculated in order to attend all the installations and insure the correct operation of the Central Alarm Node.

6. The obtained data from the economical and financial chapter is very promising, with a TIR ratio of 14,49% in ten years. By comparing the obtained results with those from the competition it is safe to assure that we can establish a competitive business.

6.1.   Future Work

As a future work, there are the next points:

1. Value the deployment of a new department of private security guards and then the possibility of offer more services related with guard services to the clients.

2. Study the viability of install another headquarter in other community in order to expand the market opportunities for the company enabling its growth and profitability.

6.2.   Environmental Impact

The companies try to maintain the environmental impact on minimums, deploying devices which would go unnoticed, keeping aesthetics and the visual integrity of their location.

CHAPTER 7. BIBLIOGRAPHY

PRODUCTS

Some Providers

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- http://www.satoelectronica.com/

Product brands

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- DSC➔ http://www.dsc.com/Default.aspx?id=32

- DEAsecurity ➔ http://www.deasecurity.com/

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ANNEX

Annex A: Products

A.1   Alarm Central

- Eight programmable hard-wired o wireless burglary zones.

The system can have up to eight different devices to detect the burglary. These zones can be hard-wired or wireless depending on the characteristics of the devices.

- Eight programmable user codes and eight radio remote user codes.

It is possible to program up to eight user codes (for use on the keyboard) and eight radio codes (for use with RF commands). Only the Master Code (the code of the installer) can add or change the user codes.

- Two areas.

The alarm system could be portioned in two different areas. Each area with its master code.

- DTMF (Dual-tone multi-frequency) telephone arming.

The system can be armed from a remote location, in this case the CAN with a communication between a DTMF telephone and the alarm central. Also the system can be configured using the telephone line.

- Remote programming.

With software is possible to program the zones remotely, run diagnostics, arm systems and bypass zones. All these operations can be done from the CAN.

- Arming modes.

The system can be armed in two different modes basically: the away mode that arms the entire system (all the zones) and the named stay mode that arms some zones, not all (this mode is used when the owners are in the house and want to activate part of the alarm system).

- Automatic battery testing.

Although the alarm central is connected to the electrical network it has a battery for prevent possible power cuts. When the system detects a low capacity back-up battery, it creates a low battery fault that is sent to the CAN.

The system alarm central, inside the box, has a battery in order to assure the functioning of all the components of the alarm system during while cut off the electrical network. It also has other devices for example the tamper in order to avoid possible handle of the central.

A.2   Keyboard

- Arming methods

The keyboard allows two different methods for arm the system. The first method is entering the user code followed by the AWAY button. In the second method only is necessary to hold down the AWAY button for arm the system. On the other hand, there is only one way to disarm the system that is by entering the user code followed by the AWAY button.

- Fire, medical and panic alarms

If there is an emergency like a fire, medical or panic. Holding on the buttons STAY+AWAY the system alarm is activated and then an emergency signal is sent to the CAN where they will phone to the customer asking for the problem and then will try to solvent it.

A.3   Movement Detector

- Sensor Data Fusion Technology

Sensor data fusion is a technology that uses software that allows gather signals from five sensors. This technology is useful for avoid false alarms because before giving an alarm is necessary to compare all the data and then make the decision if it is an alarm or a false alarm. The five sensors used are two pyroelectric sensors, a range adaptive radar sensor, a room temperature and a white light level sensor. Next we will explain the function of each sensor.

  o Pyroelectric Sensor

This sensor detects the movement of the objects measuring the infrared light radiation. The movement is detected when an infrared source with one temperature, such as a human (36,5 ºC), passes in front of an infrared source with another temperature, such as a wall.

This device uses two pyroelectric sensors, one is for a long-range coverage and the other one for a short-range and middle-range coverage. In the figure 2.4 the long-range coverage is represented with the beam number 1 and the middle and short-range with the beams 2 and 3.

o   Range Adaptive Radar

The radar system is based on the Doppler effect of the returned echoes to the signal send it at first. If a person or something passes through the protected zone this will produce a change in the received echo and this change will be interpreted as an alarm.

The microwave transceiver (transmitter and receiver) automatically adjusts its detection thresholds based on the input from the PIR sensors. Integrating the target distance information from the PIR is possible to reduce false alarms.

o   Room Temperature

With a sensor of temperature is possible to do dynamic temperature compensation. The detector automatically adjusts its PIR sensitivity to identify human at critical temperatures. The temperature compensation detects human body accurately and then is possible to avoid false alarms.

If the room temperature is near to the temperature of the human body is necessary to have a high PIR sensitivity in order to detect a human. On the other hand, if the room temperature is so different from the human body temperature a low sensitivity is better than a high in order to avoid false alarms.

o   White light level sensor

An internal light sensor measures the level of light intensity directed at the face of the detector. Sensor data fusion technology uses this information to eliminate false alarms from bright light sources.

- Tri-focus Optics

Tri-focus optics technology uses optics with three specific focal lengths: long-range coverage, middle-range coverage and short-range coverage. The standard coverage is about 18 m x 25 m but it has a mode of short-range coverage of 8m x 10 m.

The next image A.1 shows the area covered by the sensor in a standard mode:

Horizontal Plane

Vertical Plane
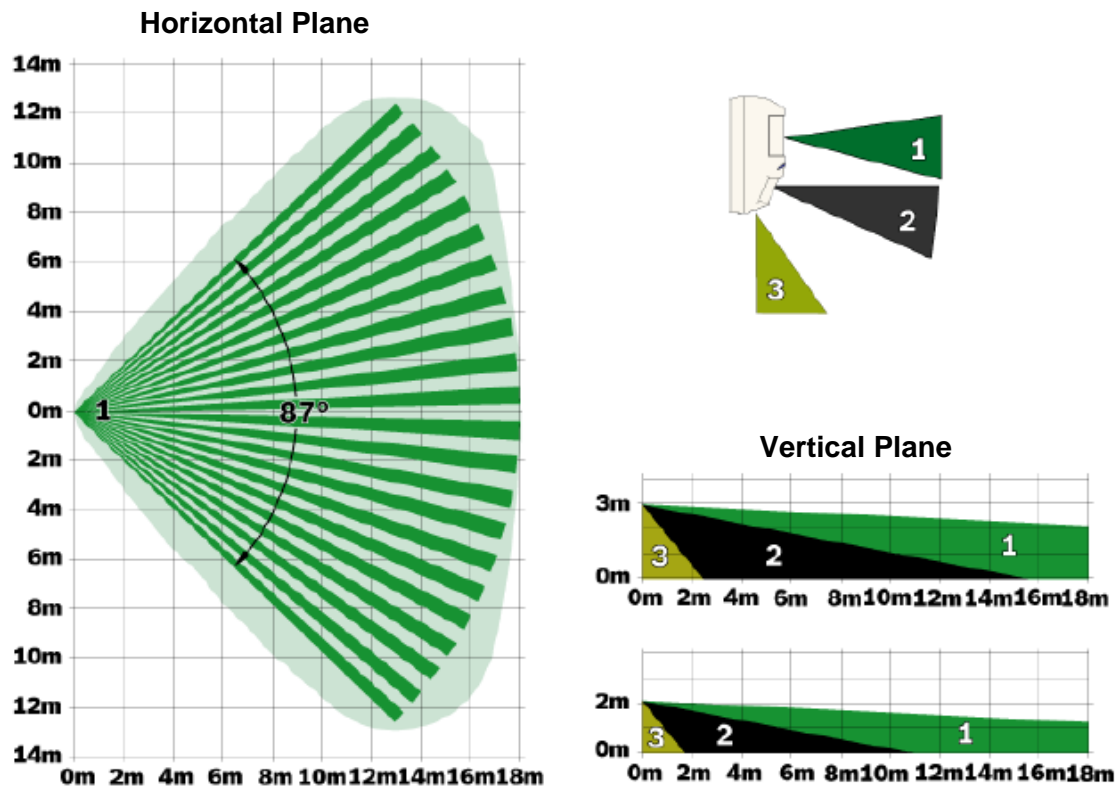
Fig A.1 Detector Coverage

- Anti-mask technology

Anti-mask technology or MANTIS (**M**ulti-point **Ant**i-mask with **I**ntegrated **S**pray) uses patented prism lenses and active infrared detection to provide protection against all known forms of attack. When the system identifies a masking material, the detector sends an alarm to the keyboard and also to the CAN.

- Cover and Wall Tamper Switch

The tamper is a system that when somebody removes the cover of the detector or separates the detector from the wall it sends an alarm to the keyboard and also to the CAN.

A.4   Special Intrusion alarm Products

A.4.1   Protection Barrier

In this case, the protection barrier is not a physical obstacle, it is a barrier made by an infrared or laser beam that detects if somebody passes through it.

In the market there are a lot of different barriers with different characteristics: with different number of beams (1, 2, 4, 6, 8), with different sizes and also there are some that can be camouflaged inside a street lamp.

The detection system is simple, when a beam transceiver does not receive the beam from the receiver (because the line between them has been interrupted by an object) an alarm signal is send it to the alarm central.

Next different images of different types of protection barrier are shown in the figure A.2.

Fig A.2 Protection Barrier

A.4.2   Glass Break Detectors

As their name indicates they have the objective detecting broken glasses. In the market it is possible to find two different types of detectors: the first one function by detecting glass vibration and the second one by sound.

Sound glass break detectors use a microprocessor-based sound analysis technology (SAT) to listen for the specific frequencies associated with breaking glass.

In the market there are different detectors with different cover designs.

Fig A.3 Glass break detectors

The figure A.3 shows the glass break detectors of Bosch.

A.4.3   Seismic Detector

These systems, also named mass inertia shock sensors have the main objective of detect blows on a surface. Depending on the circumstances, they can be more or less sophisticated. For example the seismic detector of a strongbox is more sophistical than the detector for a wall because it detects more types of attacks (vibrations caused by explosives, tools such as diamond-tipped drills, mechanical and hydraulic rams, flame cutters, thermal lances or water jet cutters).

Its principle of functioning is detecting the vibrations produced by the effect of blowing the surface protected.

The next image A.4 shows how a seismic detector is used typically on walls.

Fig A.4 Seismic detector

A.4.4   Perimeter Protection

Another important place to protect is the perimeter around the location. The perimeter will be divided in two different parts: the metal fence that surrounds the location and the ground covered between the fence and the house.

For a metal fence the deformation and movement of the structure can be detected, caused by people climbing over it or the breaking of the fence. Depending the type of metal fence, rigid or not, there are different types of sensors.

The systems selected as an example of metal fence protection are from the firm "Deasecurity" and the models are the **Torsus** for rigid fences and the **Serir** for flexible fences.

The next image A.5 shows a rigid metal fence system and a flexible metal fence:
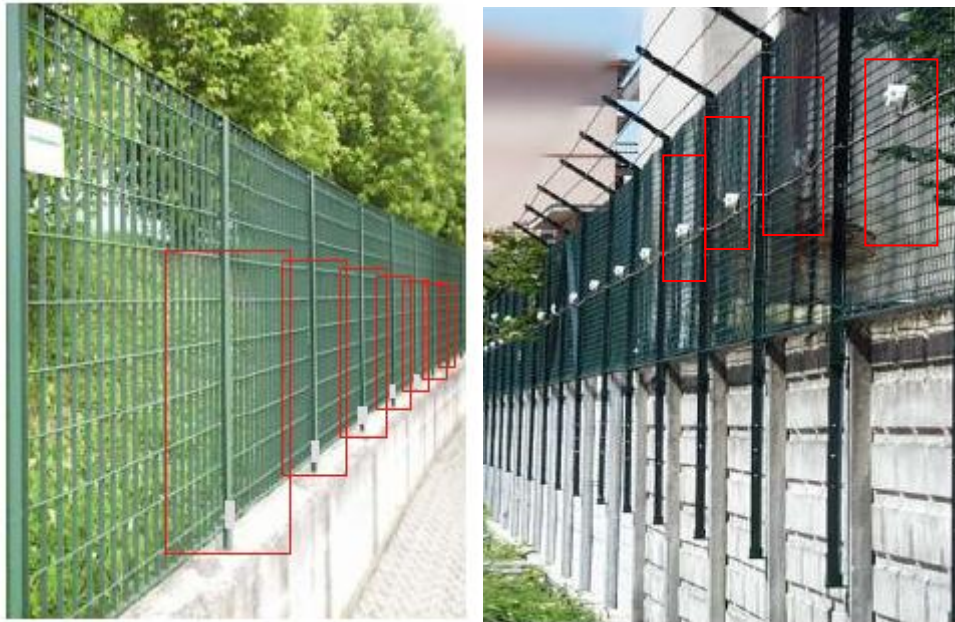
Fig A.5 Metal fence sensor

The system uses piezoceramic (piezoelectric ceramic) sensors that detect the vibration of the metal fence and then, these vibrations are processed by a microprocessor in order to avoid false alarms (like environmental disturbances).

The perimeter between the fence and the building can be protected using underground seismic sensors. These sensors are able to detect the pressure waves generated by a person walking.

Depending on the type of surface there are different types of sensor. For example, the waves produced walking on a surface made of lawn or gravel are not the same produced walking over paving.

The **Sisma CA** for paving surfaces and the **Sisma CP** for underground protection have been chosen as examples of perimeter system protection. Both systems are from Deasecurity.

The image A.6 shows an example of an underground system for a paving surface and for lawn surface.

Fig A.6 Underground systems

As an alternative, some protection barriers and some PIR detectors designed for outdoor use for this purpose also can be used as perimeter protection.

A.4.5   Communication System

The communication with the CAN, in other words the transmission of the alarms, usually is achieved through the public switched telephone network (PSTN). But there are devices that permit the use of other systems to send the information to the CAN and also to the owner.

The telephone network is the most usual way of communication, the alarm signal is sent as a typical phone call that is paid for by the service subscriber. There is another possibility of transmit the data, for example the Internet. If the owner has an ADSL line there is the possibility of send the data using the TCP/IP (Transmission Control Protocol / Internet Protocol) technology and, if this is not possible then the device will fall back on the phone call.

When the system that uses the PSTN does not work it is possible to use other technologies such as GSM or the Radio spectrum. With GSM the transmission can be done as a phone call over GSM or a SMS, the system works as a mobile phone with its own SIM (Subscriber Identity Module) card. Another possibility is using the radio spectrum, in this case Trunking technology that is a mobile system for private applications.

All these systems are alternatives to the PSTN, when the telephone network fails it is possible to fall back on the others.

The next image shows a GSM system and a TCP/IP system.

Fig A.7 Communication systems

A.5   Special Fire alarm Products

A.5.1   Linear thermal and smoke detector

These sensors have a big range and are based in a system with one emitter and one receiver. The transmitter sends a beam of light to one reflector which reflects the beam of light that is send it to the receiver. Depending the signal received the alarm will be activated or not (the change of the received power indicates it).

As an example there is the system **ZP7BMR-100** from **Ziton** that has a range from 50 to 100 meters. This system is showed in the figure 2.19.

Fig A.8 Linear thermal and smoke detector

A.5.2   Aspiration detector

The aspiration systems are smoke detectors and can be connected to an air ventilation tube or be located in an electric cabinets or places with danger of fire. These systems aspire the air of the tube or of the place where there are located in order to detect signals of fire (smoke particles).

The next image A.9 shows an example of aspiration detector, the **Z-ASD1** from **Ziton**. This system is composed by two smoke sensors inside an aspiration cage.

Fig A.9 Aspiration detector

A.5.3   Temperature detector

Temperature detectors works similar to thermal detectors but have bigger ranges. In order to achieve bigger ranges they use fiber optic as a sensor to detect variations of temperature. The variations of temperature (>1ºC) produce changes in the fiber optic that can be detected by the system, analyzing these changes the system can detect the place where has been produced the variation with an error of 1 meter.

As an example of temperature detector system, in the figure A.10 there is the **LTS240SCW** from Sensa that has a range of 4 kilometers.

Fig A.10 Temperature detector

A.5.4   Gas detector

Gas detectors measure the concentration of carbon monoxide or other gases.

The **DCO-170** from **Casmar** is an example of gas detector. The image A.11 shows three of them.

Fig A.11 Gas detector

A.5.5   Flame detector

Flame detectors use the PIR technology used also in the security system detectors. They measure the radiation generated in the place and if detect a high radiation (produced by the flame) they send an alarm signal to the central.

The figure A.12 shows the **ZIR26501** system from **Ziton**.

Fig A.12 Flame detector

A.6   Special CCTV Products

A.6.1   Domo & keyboard

A domo is an advanced camera that can change its characteristics of image capture configuration) by telemetry. These cameras are usually used with a keyboard for configure and use it.

The next image shows the **Legend** domo from **GESecurity.**

Fig A.13 Domo

This domo can be used during day or night and has a x26 optical zoom and x12 electronic zoom. With a resolution of 470 lines, it can be programmed to patrol a certain area including private zones (no image capture) in order to conform with the Organic Law 1/1982 about the Civil Protection, the image A.14 shows an example of a private zone configured in a domo.

Fig A.14 Private zone

A keyboard compatible for this domo is the **KT-405U** from **GESecurity**. With this keyboard it is possible to control all the PTZ (Pan/Tilt/Zoom) movements of the domo modifying the velocity of the movements as the user sees fit. Also, with this keyboard it is possible to control digital recorders, multiplexers (several inputs and only one output) and matrices (several inputs and several outputs). The image A.15 shows an image of the keyboard.

Fig A.15 keyboard

A.6.2   Video analyzers

Video analyzers are powerful devices that connected to the cameras provide a powerful indoor/outdoor pattern detection. They can be used in all the CCTV security cameras types and usually are based in DSP (Digital Signal Processing) systems.

The figure A.16 shows the **loibox trk4000d** from the firm **loimage** as an example of a video analyzer.

Fig A.16 Video analyzer

The main characteristics of this video device are the capacity for 4 video channels, 4 CIF resolution (704x576) and compatibility with PTZ (in order to move the camera automatically). It offers various detection modes: intrusion, unattended baggage, objects removal, domo tracking, stopped vehicle, camera tampering.

The figure A.17, shows a possible schematic of a video analyzer installation.
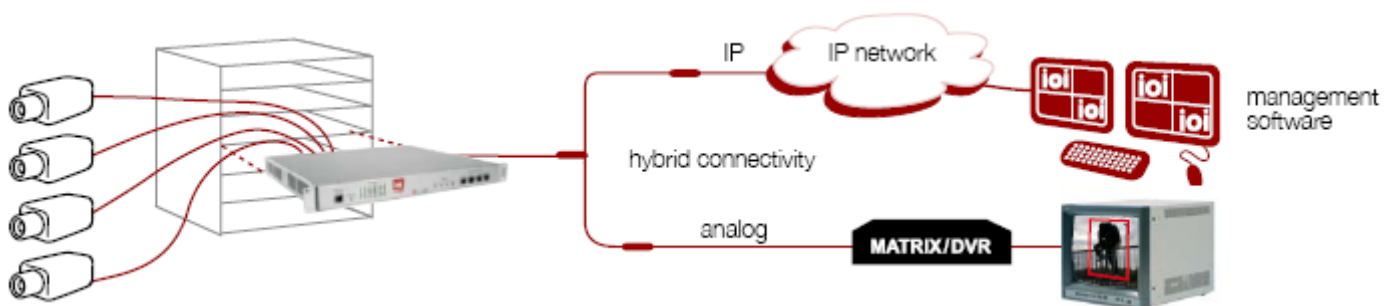
Fig A.17 Scheme

The video analyzer also can be controlled remotely by the TC/IP protocol trough specific software.

A.6.3 Thermal cameras

Thermal cameras capture infrared radiation in order to create an image. The infrared radiation is emitted by all the objects based on their temperatures so it is possible to detect humans and animals against the environment, with independence of it being day or night. The technology used in these devices is called FLIR (forward looking infrared).

The **2400xp Advanced** from **Thermal-Eye** is a good example of such cameras. This device has two cameras (thermal and visible light capturing camera) which allow day/night vision and it is compatible with video analyzers. This model also is provided with an automatic arm in order to move the camera in pan, tilt and zoom (the zoom feature is only available with the visible light capturing camera).

The figure A.18 shows an image of the camera and also two images, the first one obtained without thermal vision and the second one obtained with the thermal camera.
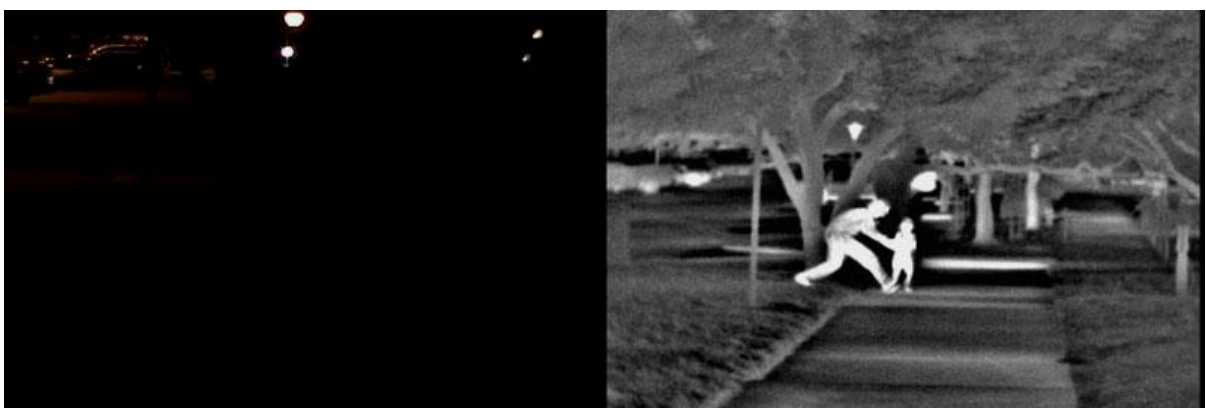
Fig A.18 Thermal Camera

This type of cameras with this technology is used in very special installations like military and marine applications.

A.6.4   Hidden cameras

Hidden cameras are used in order to record people without their knowledge. These types of cameras are used in household surveillance and there are build in common objects. These cameras can be wired or wireless.

The following image (Figure A.19) shows different hidden cameras in typical household objects.

Fig A.19 Hidden cameras

Annex B: Enterprise Structure

B.1 Workers Profile

Each person in the company has a specific position in the structure schema and a specific profile in order to accomplish his/her functions. The characteristics of each profile are detailed as such:

B.1.1 Engineers

Engineers have important positions inside the company hierarchy, including some of maximum responsibility. In total there are three engineers occupying the following positions: Head of the company, head (manager) of the installation department and the head (manager) of the Central Alarm Network.

All the engineers must have some degree of expertise over the tasks that comprise the other departments in order to temporarily take charge if the others are indisposed to work or away on vacation.

- Company Director

This director has the responsibility of the correct functioning of all the company and also to coordinate the communication between the different departments.

Also, he can help the other engineers if it is necessary.

- Manager of the installations department

The manager of the technical department has the responsibility of coordinating and distributing the workload between the installation technicians. He or she must know all the products that are available in the market and wage the possibility of their use depending on the project at hand.

Among other responsibilities, the manager of the installations department has the task of forming the installation technicians with the company's installation procedures, the use of new devices and technologies and security standards.

- Manager of the Central Alarm Network

He or she is the person responsible of the correct functioning of the CAN, including all the workers and all the equipment. He is also responsible for familiarizing the employees of the department with the material and department policies.

There should exist a coordinated communication between the managers of the installations department and the company director with the goal of informing about the new installations, its characteristics and their connection to the central alarm network.

B.1.2   Junior Engineer

These engineers will visit all the clients that the marketing & commercial department has contacted, in order to study their needs and plan out the installation for the installation technicians.

One of these engineers will be in charge of the Marketing and Commercial department.

B.1.3   Installers

The installation technicians are the people who install the security systems following the instructions given by the plan designed by the junior engineers. They must be proficient with the devices in order to understand their functionality. He or she should have a professional and presentable aspect since he/she is working on site with the customer gaining apart from client satisfaction, possible commendations on behalf of the costumer to other possible clients.

The company will be comprised of two different categories of installation technicians: first category technicians and of second category technicians. This hierarchy is instated in order to avoid problems when working in pairs.

Usually the work of the installations will be carried out in pairs, except in special cases where the work is done individually (like reparations, some revisions, etc.).

- First Category Installation Technician

This category of technicians is the people who have more experience installing security alarms and also repairing them. When the work is done in pairs or in groups, these installation technicians will supervise the work of others making sure it is done properly.

- Second Category Installation Technician

Second category technicians must have the same knowledge of the first category. The main difference between them is the amount of experience in the field, the first category installation technicians have more experience and they have worked in more projects than the second category technicians.

When the work is done in pairs, this category of technicians must follow the instructions of the first category worker.

B.1.4   CAN Workers

The CAN operators are under the responsibility of the engineer in charge of the Central Alarm Node. The CAN should be operational 24 hours a day all year long, with no exceptions, with two people working each shift and attending the alarm signals and communications.

B.1.5   Administration

The administration department would be comprised of two people: the administrator and the administrator's aids. The administrator will be responsible of the accounting of the company and also to inform to the director about the business evolution. The administrator's aids will help the administrator in his/her tasks.

B.1.6   Commercial & Marketing

The commercial and marketing employees work under the supervision of the junior engineers in the commercial and marketing department. They work together and have the same goal: gain clients.

Their work will consist in capturing new clientele through different marketing activities. They usually will work in the office and will be answering the phone calls.

B.2   Number of Employees

The number of installation technicians will increase each year as the number of each installation type increases. The staff size needs would be evaluated on a yearly basis. The new incorporations to the staff are carried out at the beginning of each year, with slightly over sized dimensions, to cover holidays and sick leaves.

When hiring new staff members the necessary infrastructure expenses should also be taken into account (vehicle, tools and office material and space).

B.2.1   First Year

In order to calculate the number of workers that the company will need in its first year (supposing that the activity begins in January) it is necessary to know the number of installations that need to be deployed by December. Also it will be

necessary to know the average number of installations per day and the average time that each installation requires.

To estimate the staff dimensions, we fist calculate a team's (pair of installation technician's) workload in hours per month versus the number of hours needed to complete all the installation in December. From the latter we can easily obtain the number of installation technicians the company needs.

Table B.1 Installation Technicians

Hours per Team				
Working days at month	Hours per day	Displacement hours per day	Working hours	Hours per team
20	8	2	6	120

Hours for install the installations of December			
Type of Installation	Number of installations	Hours per installation	Total hours December
Private	39	4	156
Enterprise	20	6	120
Store	15	8	120
Project	3	10	30
Total	**77**		**426**

Number of teams			
Total Hours December	Hours per Team	Number of Teams	Number of workers
426	120	3,55 ➔ 4	8

The latter estimation was conceived with 20 work days per month. In reality a month has an average of 22 workdays. The 2 days left out would serve as a margin for transportation and delays in the job. So far as the estimate goes, the company needs a total of 4 teams (8 workers) for its first year of activity.

By the end of the first year, the company will perform 3,85 installations per day. This is not a high rate of installations taking in account that the company is composed by 4 teams of installation technicians.

B.2.2   Second Year

The method to estimate the staff needs for the second year of activity are the same as before, with one difference, that is an estimate monthly growth rate of 1,5%.

The table B.2 represents the accommodation of the growth in workload in terms of staff members.

Table B.2 Installation Technicians

Hours for install the installations of December			
Type of Installation	Number of installations	Hours per installation	Total hours December
Private	46,63	4	186,52
Enterprise	23,91	6	143,47
Store	17,93	8	143,47
Project	3,59	10	35,87
Total	**92,06**		**509,33**

Number of teams			
Total Hours December	Hours per Team	Number of Teams	Number of workers
509,33	120	4,24 ➜ 5	10

As a result, in the second year of activity, it will be necessary to hire two more workers (another team). On December of the second year the company will perform 4,60 installations per day.

B.2.3 Third Year

For the third year of company activity we estimate 2% monthly growth with the results presented in table B.3

Table B.3 Installation Technicians

Hours for install the installations of December			
Type of Installation	Number of installations	Hours per installation	Total hours December
Private	59,14	4	236,55
Enterprise	30,33	6	181,96
Store	22,74	8	181,96
Project	4,55	10	45,49
Total	**116,76**		**645,96**

Number of teams			
Total Hours	Hours per Team	Number of	Number of

December		Teams	workers
645,96	120	5,38 ➔ 6	12

In this case, there 12 workers are necessary to perform all the installations during the third year. It would be necessary to hire a new team of installation technicians (two more workers).

B.3   CAN Workers

The number of CAN operators is invariant throughout the year, since this department has a continuous round o'clock operation. The estimated needs can be observed in the following table B.4:

Table B.4 CAN workers

CAN workers				
Days per month	Hours per month	Worker hours per month	Number of CAN workers	Number of hired workers
31	744	160	4,65 ➔ 5	10

Hence it would be necessary to hire 5 workers, but for avoid problems (sick leaves, holidays, etc) 10 workers will be hired, and when possible, they will work in pairs.

Annex C: Economical and Financial Plan

C.1   First Year

C.1.1   Number of Installations per month

	January	February	March	April	May	June	July	August	September	October	November	December
Private	0,00	20,00	20,00	23,00	24,00	26,00	27,00	30,00	33,00	34,00	36,00	39,00
Enterprise	0,00	12,00	12,00	12,00	15,00	15,00	16,00	16,00	16,00	17,00	18,00	20,00
Store	0,00	8,00	10,00	10,00	10,00	12,00	12,00	13,00	14,00	14,00	14,00	15,00
Project	0,00	1,00	1,00	1,00	1,00	2,00	2,00	2,00	2,00	3,00	3,00	3,00
TOTAL	0,00	41,00	43,00	46,00	50,00	55,00	57,00	61,00	65,00	68,00	71,00	77,00
Inst/day (20)	0,00	2,05	2,15	2,30	2,50	2,75	2,85	3,05	3,25	3,40	3,55	3,85

C.1.2   Incomes

C.1.2.1   Sales (installations)

	Sell price	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
Private	692,99	0,00	13.859,74	13.859,74	15.938,70	16.631,69	18.017,66	18.710,65	20.789,61	22.868,57	23.561,56	24.947,53	27.026,49	216.211,94
Enterprise	1.673,05	0,00	20.076,54	20.076,54	20.076,54	25.095,68	25.095,68	26.768,72	26.768,72	26.768,72	28.441,77	30.114,81	33.460,90	282.744,61
Store	4.430,88	0,00	35.447,01	44.308,76	44.308,76	44.308,76	53.170,51	53.170,51	57.601,39	62.032,26	62.032,26	62.032,26	66.463,14	584.875,63
Project	13.347,56	0,00	13.347,56	13.347,56	13.347,56	13.347,56	26.695,11	26.695,11	26.695,11	26.695,11	40.042,67	40.042,67	40.042,67	280.298,70
	TOTAL	0,00	82.730,85	91.592,60	93.671,56	99.383,68	122.978,96	125.345,00	131.854,83	138.364,67	154.078,26	157.137,28	166.993,20	1.364.130,88

C.1.2.2 CAN Connections

Connection/month(euros)
20,00

	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
Number of Connections	0,00	41,00	83,00	127,00	175,00	227,00	281,00	338,00	398,00	461,00	526,00	596,00	**596,00**
Connection Incomes	0,00	820,00	1.660,00	2.540,00	3.500,00	4.540,00	5.620,00	6.760,00	7.960,00	9.220,00	10.520,00	11.920,00	**65.060,00**

C.1.2.3 Total Incomes

	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
TOTAL INCOMES	0,00	83.550,85	93.252,60	96.211,56	102.883,68	127.518,96	130.965,00	138.614,83	146.324,67	163.298,26	167.657,28	178.913,20	1.429.190,88

C.1.3 Costs

C.1.3.1 Variable Costs (Cost Sales)

	Cost Install	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
Private	364,73	0,00	7.294,60	7.294,60	8.388,79	8.753,52	9.482,98	9.847,71	10.941,90	12.036,09	12.400,82	13.130,28	14.224,47	**113.795,76**
Enterprise	880,55	0,00	10.566,60	10.566,60	10.566,60	13.208,25	13.208,25	14.088,80	14.088,80	14.088,80	14.969,35	15.849,90	17.611,00	**148.812,95**
Store	2.332,04	0,00	18.656,32	23.320,40	23.320,40	23.320,40	27.984,48	27.984,48	30.316,52	32.648,56	32.648,56	32.648,56	34.980,60	**307.829,28**
Project	7.025,03	0,00	7.025,03	7.025,03	7.025,03	7.025,03	14.050,06	14.050,06	14.050,06	14.050,06	21.075,09	21.075,09	21.075,09	**147.525,63**

C.1.3.2 Variable Costs (Marketing Commissions Costs)

	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
	0,00	3.110,18	3.443,33	3.521,49	3.736,23	4.623,27	4.712,22	4.956,95	5.201,68	5.792,42	5.907,42	6.277,94	**51.283,12**

C.1.3.3 Fixed Costs

Workers		Each one	Total
3,00	Engineer	3.848,54	11.545,63
2,00	junior engineer	3.078,83	6.157,67
4,00	First Category Installer	2.924,89	11.699,57
4,00	Second Category Installer	2.770,95	11.083,80
10,00	CAN	2.770,95	27.709,50
1,00	Administrator	2.617,01	2.617,01
1,00	Administrator's aid	2.463,07	2.463,07
2,00	Marketing	2.617,01	5.234,02
27,00		**TOTAL**	**84.667,92**

Bills (Generic Expenses)	
light	
water	
phone	
TOTAL	300,00

Marketing Expenses	
Total	**2.000,00**

Other Expenses			
	nº cars	price	
Cars(fuel&maintenance)	6,00	300,00	1.800,00
Office Equipment			80,00
Equip maintenance			100,00
Policy of Civil Responsability			420,00
Others			100,00
		TOTAL	**2.500,00**

C.1.3.4 Total Costs

January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
89.467,92	136.120,65	141.117,88	142.290,22	145.511,35	158.816,96	160.151,18	163.822,15	167.493,11	176.354,15	178.079,16	183.637,02	**1.842.861,74**

C.2 Second Year

C.2.1 Number of Installations per month

	January	February	March	April	May	June	July	August	September	October	November	December
Private	39,59	40,18	40,78	41,39	42,01	42,64	43,28	43,93	44,59	45,26	45,94	46,63
Enterprise	20,30	20,60	20,91	21,23	21,55	21,87	22,20	22,53	22,87	23,21	23,56	23,91
Store	15,23	15,45	15,69	15,92	16,16	16,40	16,65	16,90	17,15	17,41	17,67	17,93
Project	3,05	3,09	3,14	3,18	3,23	3,28	3,33	3,38	3,43	3,48	3,53	3,59
TOTAL	78,16	79,33	80,52	81,72	82,95	84,20	85,46	86,74	88,04	89,36	90,70	92,06
Inst/day (20)	3,91	3,97	4,03	4,09	4,15	4,21	4,27	4,34	4,40	4,47	4,54	4,60

C.2.2 Incomes

C.2.2.1 Sales (installations)

	Sell Price	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
Private	692,99	27.431,89	27.843,37	28.261,02	28.684,93	29.115,21	29.551,94	29.995,22	30.445,14	30.901,82	31.365,35	31.835,83	32.313,37	357.745,08
Enterprise	1.673,05	33.962,81	34.472,26	34.989,34	35.514,18	36.046,89	36.587,60	37.136,41	37.693,46	38.258,86	38.832,74	39.415,23	40.006,46	442.916,23
Store	4.430,88	67.460,09	68.471,99	69.499,07	70.541,55	71.599,68	72.673,67	73.763,78	74.870,23	75.993,29	77.133,19	78.290,19	79.464,54	879.761,26
Project	13.347,56	40.643,31	41.252,96	41.871,76	42.499,83	43.137,33	43.784,39	44.441,15	45.107,77	45.784,39	46.471,15	47.168,22	47.875,75	530.038,01
	TOTAL	169.498,10	172.040,57	174.621,18	177.240,50	179.899,11	182.597,59	185.336,56	188.116,61	190.938,36	193.802,43	196.709,47	199.660,11	2.210.460,59

C.2.2.2   CAN Connections

Connection/month (euros)
25,00

	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
Number of Connections	715,00	786,00	857,00	929,00	1.001,00	1.074,00	1.147,00	1.221,00	1.295,00	1.370,00	1.446,00	1.522,00	**1.522,00**
Connection Incomes	17.875,00	19.650,00	21.425,00	23.225,00	25.025,00	26.850,00	28.675,00	30.525,00	32.375,00	34.250,00	36.150,00	38.050,00	**334.075,00**

C.2.2.3   Total Incomes

	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
TOTAL INCOMES	187.373,10	191.690,57	196.046,18	200.465,50	204.924,11	209.447,59	214.011,56	218.641,61	223.313,36	228.052,43	232.859,47	237.710,11	**2.544.535,59**

C.2.3   Costs

C.2.3.1   Variable Costs (Cost Sales)

	App.Cost	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
Private	364,73	14.437,84	14.654,40	14.874,22	15.097,33	15.323,79	15.553,65	15.786,96	16.023,76	16.264,12	16.508,08	16.755,70	17.007,03	**188.286,89**
Enterprise	880,55	17.875,17	18.143,29	18.415,44	18.691,67	18.972,05	19.256,63	19.545,48	19.838,66	20.136,24	20.438,28	20.744,86	21.056,03	**233.113,81**
Store	2.332,04	35.505,31	36.037,89	36.578,46	37.127,13	37.684,04	38.249,30	38.823,04	39.405,39	39.996,47	40.596,41	41.205,36	41.823,44	**463.032,24**
Project	7.025,03	21.391,22	21.712,08	22.037,77	22.368,33	22.703,86	23.044,42	23.390,08	23.740,93	24.097,05	24.458,50	24.825,38	25.197,76	**278.967,38**

C.2.3.2   Variable Costs (Marketing Commissions Costs)

January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
5.649,94	5.734,69	5.820,71	5.908,02	5.996,64	6.086,59	6.177,89	6.270,55	6.364,61	6.460,08	6.556,98	6.655,34	73.682,02

C.2.3.3   Fixed Costs

Workers		Each one	Total
3,00	Engineer	4.002,48	12.007,45
3,00	junior engineer	3.201,99	9.605,96
5,00	First Category Installer	3.041,89	15.209,44
5,00	Second Category Installer	2.881,79	14.408,94
10,00	CAN	2.881,79	28.817,88
1,00	Administrator	2.721,69	2.721,69
1,00	Administrator's aid	2.561,59	2.561,59
2,00	marketing	2.721,69	5.443,38
30,00		TOTAL	100.382,28

Bills	
light	
water	
phone	
TOTAL	325,00

Marketing Expenses	
TOTAL	2.000,00

Other Expenses			
	nº cars	price	
cars(fuel&maintenance)	8,00	300,00	2.400,00
office equipment			80,00
Equip maintenance			100,00
Policy of Civil Responsability			420,00
Others			100,00
		TOTAL	3.100,00

C.2.3.4   Total Costs

January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
200.666,75	202.089,64	203.533,87	204.999,77	206.487,66	207.997,87	209.530,72	211.086,58	212.665,77	214.268,64	215.895,56	217.546,89	**2.506.769,71**

C.3   Third Year

C.3.1   Number of Installations per month

	January	February	March	April	May	June	July	August	September	October	November	December
Private	47,56	48,51	49,48	50,47	51,48	52,51	53,56	54,63	55,73	56,84	57,98	59,14
Enterprise	24,39	24,88	25,38	25,88	26,40	26,93	27,47	28,02	28,58	29,15	29,73	30,33
Store	18,29	18,66	19,03	19,41	19,80	20,20	20,60	21,01	21,43	21,86	22,30	22,74
Project	3,66	3,73	3,81	3,88	3,96	4,04	4,12	4,20	4,29	4,37	4,46	4,55
TOTAL	93,90	95,78	97,70	99,65	101,64	103,68	105,75	107,87	110,02	112,22	114,47	116,76
Inst/day (20)	4,70	4,79	4,88	4,98	5,08	5,18	5,29	5,39	5,50	5,61	5,72	5,84

C.3.2   Incomes

C.3.2.1   Sales (installations)

	Sell Price	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
Private	692,99	32.959,63	33.618,83	34.291,20	34.977,03	35.676,57	36.390,10	37.117,90	37.860,26	38.617,46	39.389,81	40.177,61	40.981,16	**442.057,56**
Enterprise	1.673,05	40.806,59	41.622,72	42.455,18	43.304,28	44.170,36	45.053,77	45.954,85	46.873,94	47.811,42	48.767,65	49.743,00	50.737,86	**547.301,64**
Store	4.430,88	81.053,83	82.674,91	84.328,40	86.014,97	87.735,27	89.489,98	91.279,78	93.105,37	94.967,48	96.866,83	98.804,16	100.780,25	**1.087.101,22**
Project	13.347,56	48.833,26	49.809,93	50.806,12	51.822,25	52.858,69	53.915,86	54.994,18	56.094,07	57.215,95	58.360,27	59.527,47	60.718,02	**654.956,06**
TOTAL		203.653,31	207.726,38	211.880,91	216.118,52	220.440,89	224.849,71	229.346,71	233.933,64	238.612,31	243.384,56	248.252,25	253.217,30	**2.731.416,49**

C.3.2.2 CAN Connections

Connection/month(euros)	
	30,00

	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
Number of Connections	1.649,00	1.727,00	1.806,00	1.886,00	1.967,00	2.049,00	2.133,00	2.218,00	2.304,00	2.392,00	2.481,00	2.571,00	**2.571,00**
Connection Incomes	49.470,00	51.810,00	54.180,00	56.580,00	59.010,00	61.470,00	63.990,00	66.540,00	69.120,00	71.760,00	74.430,00	77.130,00	**755.490,00**

C.1.2.3 Total Incomes

	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
TOTAL INCOMES	**253.123,31**	**259.536,38**	**266.060,91**	**272.698,52**	**279.450,89**	**286.319,71**	**293.336,71**	**300.473,64**	**307.732,31**	**315.144,56**	**322.682,25**	**330.347,30**	**3.486.906,49**

C.3.3 Costs

C.3.3.1 Variable Costs (Cost Sales)

	App.Cost	January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
Private	364,73	17.347,18	17.694,12	18.048,00	18.408,96	18.777,14	19.152,68	19.535,74	19.926,45	20.324,98	20.731,48	21.146,11	21.569,03	**232.661,87**
Enterprise	880,55	21.477,15	21.906,70	22.344,83	22.791,73	23.247,56	23.712,51	24.186,76	24.670,50	25.163,91	25.667,19	26.180,53	26.704,14	**288.053,49**
Store	2.332,04	42.659,91	43.513,11	44.383,37	45.271,04	46.176,46	47.099,99	48.041,99	49.002,83	49.982,88	50.982,54	52.002,19	53.042,24	**572.158,54**
Project	7.025,03	25.701,72	26.215,75	26.740,07	27.274,87	27.820,36	28.376,77	28.944,31	29.523,19	30.113,66	30.715,93	31.330,25	31.956,85	**344.713,72**

C.3.3.2 Variable Costs (Marketing Commissions Costs)

January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
6.364,17	6.491,45	6.621,28	6.753,70	6.888,78	7.026,55	7.167,08	7.310,43	7.456,63	7.605,77	7.757,88	7.913,04	**85.356,77**

C.3.3.3 Fixed Costs

Workers		Each one	Total
3,00	Engineer	4.202,61	12.607,82
3,00	Junior engineer	3.565,61	10.696,82
6,00	First Category Installer	3.193,98	19.163,89
6,00	Second Category Installer	3.025,88	18.155,26
10,00	CAN	3.025,88	30.258,77
1,00	Administrator	2.857,77	2.857,77
1,00	Administrator's aid	2.689,67	2.689,67
3,00	marketing	2.857,77	8.573,32
33,00		**TOTAL**	**115.700,16**

Bills	
light	
water	
phone	
TOTAL	**350,00**

Marketing Expenses	
TOTAL	**2.000,00**

Other Expenses				
		nº cars	price	
cars(fuel&maintenance)		9,00	300,00	2.700,00
office equipment				80,00
Equip maintenance				100,00
Policy of Civil Responsability				420,00
Others				100,00
			TOTAL	**3.400,00**

C.3.3.4 Total Costs

January	February	March	April	May	June	July	August	September	October	November	December	TOTAL
235.000,28	237.271,28	239.587,70	241.950,45	244.360,46	246.818,66	249.326,03	251.883,55	254.492,22	257.153,06	259.867,12	262.635,46	**2.980.346,28**

Annex D: Comparison Analysis

D.1   Economic Profitability

The economic profitability obtained of the first three years and the obtained in the analysis of the competition is showed in table D.1

Table D.1 Economic Profitability

	2009	2010	2011
Economic Profitability	-55,82 %	0,35 %	45,52 %

	Superior Average	Media	Inferior Average
Competition	13,08%	5,84%	2,05%

As observed in the last table, the economic profitability of the third year is higher than the obtained in the superior average from the competition. On probable reason for this difference is larger volume of fixed assets in the other companies due to their antiquity operating in the sector than our start-up firm.

In any case, this is a good figure for economic profitability.

D.2   Financial Profitability

The table D.2 shows the financial profitability of the first years and the one obtained from the analysis of the competition.

Table D.2 Financial Profitability

	2009	2010	2011
Financial Profitability	- 81,08 %	0,48 %	53,25 %

	Superior Average	Media	Inferior Average
Competition	28,70%	11,48%	5,08%

The financial profitability in the two first years is unfavorable since the company has not stabilized yet. The figures in the third years are higher than the ones obtained from the competition.

D.3   Liquidity

The data obtained from the liquidity analysis is shown in the table D.3

Table D.3 Liquidity

	2009	**2010**	**2011**
Liquidity	1,89	1,12	7,13

	Superior Average	**Media**	**Inferior Average**
Competition	7,96	1,53	0,99

In this case, the first two years are similar to the obtained median by the competition but in the third year the obtained value is similar to the superior average over the median. This change is due to the increase in available cash in the third year of economic activity.

D.4   Indebtedness

The indebtedness figures of the company in comparison with the competition are shown in table D.4

Table D.4 Indebtedness

	2009	**2010**	**2011**
Indebtedness	31,16 %	26,52 %	14,51 %

	Superior Average	**Media**	**Inferior Average**
Competition	80,55%	58,73%	41,79%

As observed in the figures obtained, the indebtedness of our company decreases every year since the loans are being paid for. The competition has more indebtedness probably because they have the expenses of the manufacturers in short term liabilities.

D.5   Productivity

The table D.5 shows the productivity rates from the first three years of activity and the obtained in the analysis from the competition.

Table D.5 Productivity

	2009	2010	2011
Productivity	-21,32 %	6,94 %	18,95 %

	Superior Average	Media	Inferior Average
Competition	33,25%	25,64%	18,99%

As the table D.5 shows, the productivity of the third year has the same rate as the inferior average over the median obtained from the competition. It is important to take into account that there are no expenses from the installation technicians in the sales of our company hence it is normal that the productivity would not be as high as the competition.

D.6   Number of Employees

The data about the number of employees is shown in table D.6

Table D.6 Number of employees

	2009	2010	2011
Number of Employees	27	30	33

	Superior Average	Media	Inferior Average
Competition	49	19	15

The number of employees of the company increases every year as shown previously. In any case, the number of employees is between the median and the superior average obtained from the competition. .

D.7   Property and Equipment vs. Operating Revenues

The data obtained from the property and equipment versus the operating revenues is presented in the following table.

Table D.7 Property and Equipment vs. Operating Revenues

	2009	2010	2011
P. and E. vs O. R.	49,52 %	27,43 %	19,41 %

	Superior Average	Media	Inferior Average
Competition	62,49%	23,56%	13,31%

The obtained values for the company decrease every year, this is due to the fact that the operating revenues are increasing more than the property and equipment. In any case, the rate for the third years, where the accounts of the

company starts to stabilize, is approximately the same as the median from the competition.

D.8   EBIT vs. Operating Revenues

The table D.8 shows the EBIT vs. Operating Revenues of the first three years and the obtained in the analysis of the competition.

Table D.8 EBIT vs. Operating Revenues

	2009	2010	2011
EBIT vs Operating Revenues	-31,33 %	0,10 %	13,49%

	Superior Average	Media	Inferior Average
Competition	14,16%	4,79%	2,51%

As shown in the last table D.8 the value obtained in the third year is high regarding the values obtained from the competition because it is near the superior average. This figure gives is a good indicator of the expenses from the sales, the fixed costs and the depreciation of the companies (higher values represent less expenses).

D.9   Operating Revenues vs. Employees

The next table shows the relationship between the Operating Revenues vs. Employees of the first three years and that from the competition.

Table D.9 Operating Revenues vs. Employees

	2009	2010	2011
Operating Revenues vs Employee	52.933,00	84.817,85	105.663,83

	Superior Average	Media	Inferior Average
Competition	88.254	60.185	47.417

In the last table it is possible to see the operating revenues per each employee. In this case, in the third year the obtained rates is higher than those from the competition, hence there exists a good ratio of revenues vs. employees in our company.