



INTERNATIONAL  
HELLENIC  
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**"Business plan on an innovative idea with high-growth potential"**

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SID: 3305170004

SCHOOL OF SCIENCE & TECHNOLOGY

A thesis submitted for the degree of

Master of Science (MSc) in e-Business and Digital Marketing

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## **Abstract**

An innovative technology is being developed to monitor staff for work guidance and staff security issues. In particular, a worker in special conditions (heavy industry, mines, etc.) wears a headset containing a camera, sensors of environmental parameters (atmospheric pressure, temperature, etc.) as well as an accelerometer for a possible sudden fall of the worker or loss of his senses.

All image data and sensors are sent through a device similar to a mobile phone to the internet signal processing center, which is processed and recorded. The operator of the signal reception center monitors the work and physical condition of the employee at any time on-line. It can also look up to off line to search for any topic.

Anastasia Douka

7/12/2018



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# 1 Chapter 1: Introduction

## 1.1 The meaning and importance of a business plan

Entrepreneurship is getting quite complex as time goes by. Competition has become quite fierce on a global basis, leading to companies trying harder and harder to come up with even better ideas for even more effective products in order to meet up with customers' ongoing demand. Executives and managers try their best to apply the best strategies possible, boost employee motivation and implement leadership in their everyday business routines in order to have the company run at its best form (Carayannis & Gonzalez, 2003; Cleff *et al.*, 2005).

Given these latest trends in today's business world, it is crucial to invest and succeed in good communication. Academics have long been supporting that the latter is a vital feature to possess both in the internal and external business environment. Communicate the company's message, its goals, its vision and mission, its culture and its whole philosophy to all stakeholders (Mohr & Spekman, 1994; Kock *et al.*, 2009). But this is not always an easy task; provide all interested parties with the proper information demands time and resources, while it is not always certain that all sorts of information the company wants to share are actually going to be surely and efficiently shared (Poon Teng Fatt, 1998). Thus, the idea of conducting a written text that provides readers with such information seemed to be a great idea- this is how the business plan was developed.

The latter is often characterized as a written description of the company as a whole, as the entrepreneur presents his idea to the public and all interested parties. Within this written text, corporate goals, strategy, financial data, forecasts, marketing mix and even the market's current conditions are presented and analyzed in order for the reader to better comprehend the firm's outer and inner environment (Timmons & Spinelli, 1994). More specifically, the business plan is the way the entrepreneur communicates with the public his vision of creating a company, trying to present it as realistic as possible and in fact prove his ability to organize the whole production process from the start (Mason & Stark, 2004). His potential to manage a successful firm is also proven by his ability to conduct an efficient business plan, as this is his tool to persuade shareholders that this is a promising new business project, worth investing in (Karlsson & Honig, 2004).

In fact, the power an effective business plan has is proved by the various stakeholders that exist within the corporate environment and the interests each and every one has.

Literature states that a company is not just what an entrepreneur wishes to succeed, but what all other parties- the stakeholders- also do (Clarkson, 1995; Mason & Stark, 2004). Thus, there are numerous of them, starting from the very staff members employed there and further on to suppliers and customers, rivals and government officials, even to social institutions and creditors:



*Graph 1: A company's basic stakeholders*

As it seems quite rational, all interested parties wish to satisfy their interests via the company. But there are some specific stakeholders that need specialized and analytic provision of information, since they maintain close relations to the company's welfare. First and foremost, the firm's management team. It is rational that their efficient management lead to a successful company, thus they are examined at all times whether they can actually face problems, surpass difficulties and take advantage of opportunities to generate profitability, boost sales and acquire market shares. Shareholders' maximization is also amongst their primer goals (Mason & Stark, 2004; Iverson & Zatzick, 2011).



Second, employees certainly have their own interests when it comes to the firm's performance. Since staff members are in fact the very core of the business itself, all everyday tasks are conducted by them, making it obvious that as long as they feel motivated to work productively, the firm will be performing greatly, which leads up to more sales and thus higher profitability. The company's success is closely linked to their personal one, since working for a successful business equals job safety and potential to satisfy one's needs and career goals (Iverson & Zatzick, 2011).

Thirdly, the company's creditors have a great interest in what the entrepreneur plans for his company. In the modern business world, using foreign capital to fund business projects is an everyday thing; companies often choose to borrow capital than use earnings reserved or in general Equity, since the former often equals less cost than the latter. Given that firms work by the keep-costs-low rule, it is a common thing to prefer a loan to use up savings. But at this point, the creditors' importance becomes obvious; they have to ability to choose the companies to which they offer their capital, meaning they will actually choose the ones that seem most promising and more safe to lend them money (Mason & Stark, 2004). This in turn implies that creditors- at most cases, banks- will study each company applying for a loan and estimate their potential and dynamic. Banks function as investors at this point, trying to sense which firm will use the loan to grow itself into a successful brand name. in order to conduct their own research, they need the company's full canvas, or in other words, its business plan (Abrams, 2003).

Suppliers are another interested party in the company's welfare. As they make professional agreements, they are obliged to serve the company- their client- best way possible, meaning deliver products or services on time and at the pre-determined quality. Moreover, it is nowadays a common business practice that companies often delay paying the supplier back when they make purchases on credit, leading to the supplier's delay in receiving money owed back, which in turn may even cause liquidity shortage. Since liquidity risk for the supplier is closely linked to its client's prosperity, the supplier shows great interest in studying the business plan to find out whether the company it examines to collaborate with does in fact fulfill its requirements (Abrams, 2003; Der Foo *et al.*, 2005).

Customers also share a similar interest to suppliers. Since they buy the products or services the company offers, they need to assure themselves they make the right choice. Especially when the customer refers to another company that will be buying great quan-

tities of the former's products, it is crucial to examine if the latter do bare the characteristics required and whether the company itself is being organized and managed in ways that agree with the potential clients' ones (Abrams, 2003; Der Foo *et al.*, 2005).

Lastly, all other types of stakeholders also bare similar interests. For instance, governments wish for companies to perform greatly, since the latter's profitability equal higher taxation income, while social institutions often lean to private companies initiatives to donate money or take over a necessary social cause for free. Competitors also take great interest in a rival's practices and performance, as in most markets, they all try their best to attract customers and acquire higher market shares. In addition, it is important to state that when a firm prospers, its success affects all other stakeholders and as literature states, it usually does so in a motivating and positive way (Clarkson, 1995; Karlsson & Honig, 2004; Mason & Stark, 2004).

## 1.2 Business plan conduction for innovations

When conducting a business plan, numerous difficulties and challenges may arise. Most of them are related to the entrepreneur's experience in writing such a document, while other times they may be linked to technical matters that appear after the latter is finished. Literature states that there are certain rules/ characteristics that must be followed in order for a business plan to be successful (Abrams, 2003; Der Foo *et al.*, 2005):

- *Be realistic*: time is the best judge- if the product does not meet with the promised features, or the company does not do as well as forecasted, stakeholders will ultimately feel deceived.
- *Be accurate*: every one that reads a business plan looks for details that need to be presented and explained in order for them to find what they seek for and make up their mind about the product and the company.
- *Be interesting*: the business plan aims at providing with useful information that will have stakeholders be interested in the company. Thus the writer should focus upon sharing his vision in an interesting, stimulating way.

- *Have measurable goals:* as mentioned above, the document should be accurate and provide with certain, measurable goals and figures, in order for the interested parties to better comprehend the practicalities of the project.

Such rules are vital when developing a business plan, but prove of great significance when the latter refers to a new, innovative idea. In such a case, the entrepreneur should present stakeholders with a business plan that not just proves he has the ability to organize a new firm, but possesses a brand new idea of developing a product that will potentially change the way a need is being satisfied. In other words, the business plan serves as the only means the entrepreneur has to attract stakeholders' interest and have them trust him enough in order to make the product actually exist (Chesbrough & Rosenbloom, 2002).

Given the aforementioned fact, the business plan exists before the innovation comes to life. It is thusly the only evidence the entrepreneur has of his actual idea and must be written in such a way that make it look promising. This means that he actually asks all interested parties to judge this book by its cover, since there is nothing else at this point to show (Karlsson & Honig, 2004). Taking this into account, a certain interested party-creditors- play a significant role in the company's future existence and then in the innovative product's generation. Accessing liquidity is crucial for entrepreneurs to develop their innovations, thus having creditors give the green light for a loan to be granted means actual cash being poured in the entrepreneurs hands and thus have the whole procedure start (Ford *et al.*, 2007; Pinson, 2008).

In fact, the importance that a business plan has when it comes to presenting with innovative ideas is moreover proved by the fact that worldwide there is an ongoing tendency to even organize relevant contests (Der Foo *et al.*, 2005). Banks and financial institutions, even great multinationals, ask for business plans to be conducted over innovative ideas and choose to fund the most attractive ones. Literature states that this is actually a rational trend, since competition is becoming even fiercer as time goes by, while since Informatics evolve on a rapid pace, innovations have become the only means for all industries' viability (Dodt *et al.*, 1999; Egge *et al.*, 2003).

## 1.3 Business plan structure

In order for the business plan to provide the reader with the most valuable information, literature suggests that a specific structure should be followed so that the entrepreneur's vision is efficiently communicated (Abrams, 2003). Since the business plan refers to a company's activity, usually a new one, it should inform about the near future- the first 12 months since the business plan's publishing- as well as some years after that, in order to best describe how the strategy is expected to promote the corporate welfare.

Thus, typically a business plan is structured as following (Dodt *et al.*, 1999; Ford *et al.*, 2007):

- *Introduction*: basic information concerning the new company as well as the launch of its products/ services are gathered and presented in this section. The firm's logo, its location- headquarters, its vision and mission are provided.
- *Market review*: in order for the entrepreneur to better explain the reason he founds this company, it is considered vital that first a general analysis of the current market conditions is conducted. By this way, the reader comprehends the company's external environment, while the entrepreneur proves his business instinct (eg. identifies a gap in the market or thinks that there are great opportunities for his product in this industry).
- *Marketing plan*: since launching a product is considered a complex procedure, a business plan should include the company's marketing plan. Using widely known models and tools, like the 4Ps, the entrepreneur can easily provide information about the products' features, pricing policy, promotion campaign and distribution decisions.
- *Strategy- operations analysis*: the company's strategy and tactics are presented here, as well as all necessary data that refer to technical/ practical issues. In fact, the whole production procedure is analyzed and information concerning even everyday routines and processes are presented to the reader.
- *Financial analysis*: in the business world, most stakeholders tend to care significantly for the firm's financial performance. Thus, in the financial section, the company's basic financial figures are presented and forecasts are conducted concerning the first months- or even years- of working.

According to this structure, this dissertation will develop a business plan for a new company that aims at conducting its business activities within the Technology and Informatics industry. Especially, it refers at the development and production of a new, innovative product that aims at changing the way employees at construction sites work in relation to their personal safety and health.

Moreover, since this is an innovative product, it is considered vital that a research is conducted in order to better comprehend the market's needs and requirements concerning such a product. This will contribute in finally presenting the industry with a product of high efficiency that serves its scope the best way possible. In addition, all data gathered from this research will play a significant role in developing the marketing mix and afterwards present the operations' procedures.

## Part 1: Business plan conduction

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# **2 Chapter : Introduction**

## **2.1 The development of DigiTech Safety Solutions**

DigiTech Safety Solutions is a new company that aims at entering the PPE market of Greece at the very beginning of 2019. The main goal is to present the domestic market with an innovative product that has not been introduced before in the global PPE industry. This brand new equipment is a helmet that incorporates specially designed digital chip that is connected to a software program that gathers useful data from all individuals that wear it, regarding physical measurements as well as environmental conditions that hold in the actual construction site. By this way, the construction company can both have a clearer image of the existent conditions as well as monitor each worker's health measurements and avoid any type of health risks that may cause a working accident- let alone, death. This product, the i-helmet, will be initially introduced in the Greek PPE market and after its success, the company plans at growing its production to serve new clients in Europe within the next 5 years.

This business plan is the entrepreneurs' means to communicate his vision with all stakeholders and moreover it consists a written promise on his behalf that such an innovation will actually come to life and efficiently contribute in improving construction workers' health level and even saving their lives.

Next, some useful information concerning the company's identity is presented.

## **2.2 DigiTech Safety Solutions- basic information**

**Industry:** Personal Protection Equipment (PPE)

**Country of origin:** Greece

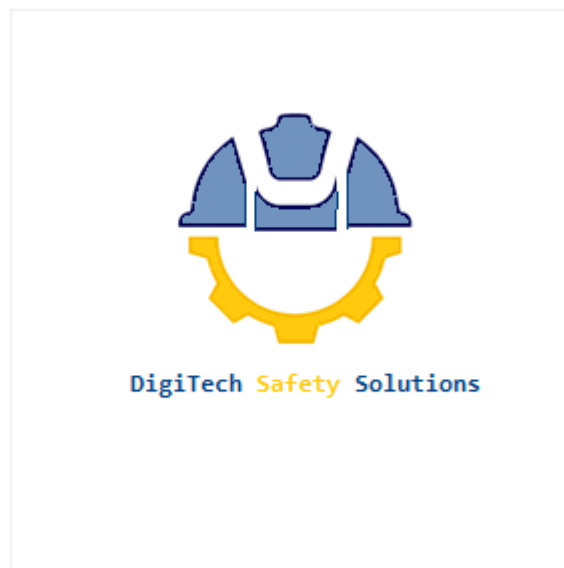
**Country that business activities take place:** Greece for the first 5 years, afterwards the firm plans at exporting its products abroad.

**Legal form:** Sole proprietorship- this type of legal form was chosen by the entrepreneur in order to be solely responsible for his firm's decision making. In addition, it was chosen because it offers a more straightforward record keeping than other business types,

while it is easier for the entrepreneur to use his own capital and invest it in ways he thinks that are profitable for the company.

**Headquarters- location:** Thessaloniki, Greece- the company will be located in the Industrial Area of Sindos, in a 2000 s.m. building that got rented for its production activities. The property includes one main building and two warehouses for inventory purposes.

**Corporate logo:**



**Year of founding:** 2019

**Motto:** We guard you

**Vision:** to become the PPE leader in the Greek market within the next 3 years

**Mission:** to make each construction worker's life easier and risk- free

**Market overview:** PPE market in Greece includes a few medium sized companies, most of which conduct their activities domestically and offer products of similar features.

Innovation is not yet a trend in the domestic market; on the contrary, European- as well as international - market players invest heavily on Research & Development in order to develop new, innovative products that will differentiate them from rivals and will contribute in acquiring greater market shares. Recent studies that will be further discussed in the next chapter show that innovation will certainly rule the industry in the years to come, as clients become more aware of their needs and demand more from PPE companies.

**Competitive advantage:** the firm possesses great knowledge of digital technology as well as experience on the construction industry and by combining the latter aims at filling the gap for a specific market need; specially designed individual safety equipment for construction workers that keeps record of physical measurements and alarms the user in order to stop his working duties when it is considered harmful for his health maintenance and potentially even threatens his life.

**Information on the entrepreneur:** N.K., 37- year- old, has studied Business Administration in University of Macedonia and possesses a post graduate degree in Strategic Entrepreneurship & Innovation by King's College in London, UK. N.K. was born and raised in Thessaloniki, Greece by a family of entrepreneurs, since his parents founded and still run one of the most successful construction companies in Northern Greece by 1979. After graduation, he worked full time in the family business as an executive assistant and then Management assistant director, while after his post graduate studies, he came back to become the company's Managing director.

His almost 13 year experience in the construction industry offered useful knowledge as he had to communicate with clients, both existent and new, on a daily basis. N.K. gradually understood that over time, the market grows great interest in personal safety during work, while his parents' company spent lot on such equipment- let alone the workers themselves that asked for even more specialized PPE. Thus, he identified that the Greek market lacks a PPE supplier that could offer the construction market what it actually asks for; a product that would be based on high technology that could help prevent accidents or health risks as well as notify when circumstance might get out of



hand. Consequently, he considered this a great opportunity to build such a company and develop such a product. This is how DigiTech Safety Solutions was born.

### **3 Chapter : Industry analysis**

### **3.1 Global market overview- trends and characteristics**

**PPE stands for Personal Protection Equipment and as the latter reveals, it refers to special equipment that when used aims at protecting an individual against health or safety risks. PPE concern equipment used at working sites, meaning that the user is obliged to have it in order to avoid any type of risk while conducting his working duties. The basic goal is to protect the user from risks related to physical accidents, heat, chemicals, biohazards, electricity (Choudhry & Fang, 2008). Today, PPE may include (<http://www.hse.gov.uk>):**

- **helmets,**
- **glass- eye protection,**
- **high-visibility clothing,**
- **gloves,**
- **respiratory gear,**
- **safety footwear and**
- **safety harnesses.**

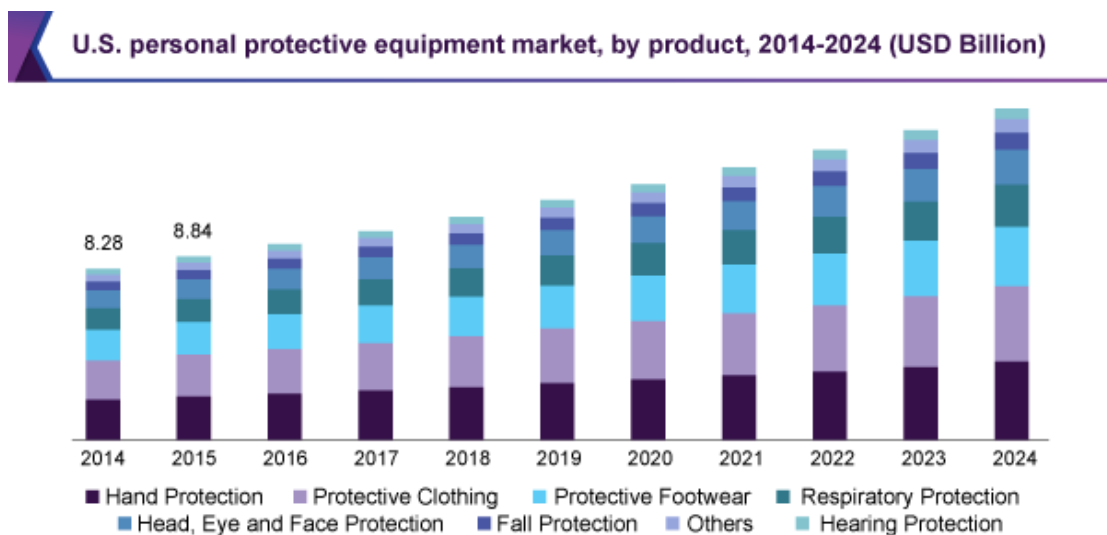
Over time, the global PPE market has undergone tremendous growth, since personal protection and employee safety has been given the proper significance during the recent decades. As time goes by, companies of various sectors do realize that employment is closely linked to maintaining safe and healthy staff members, which in turn is amongst the basic human rights. This means that recently risks during conducting working duties have been heavily recognized and taken into consideration when companies organize their production bases. Consequently, providing employees with mandatory equipment and gear to keep them safe and healthy is amongst modern construction firms' main priorities (Grand View Research, 2018; Global Market Insights, 2018).

Moreover, protecting human lives and avoiding work accidents is becoming more and more significant, as national and international institutions tend to promote strict and obligatory relevant regulations. Given the above, it seems obvious that firms that conduct their business in the PPE market have a lot of potential and are given great opportunities in the future; regulatory reforms in multiple nations will require new equipment

([www.businesswire.com](http://www.businesswire.com), 28/07/2017). At the same time, this specific industry aims at the great task of providing with products that guarantee safety and health preservation, which means that over time, as competition will become fiercer, pricing such goods will be struggling, while rivals will succeed over innovations that offer even greater safety levels and will eventually differentiate one company from another ([www.marketwatch.com](http://www.marketwatch.com), 21/06/2018).

In order to have a better view of the PPE market, it is considered vital to study the current and future trends. Such equipment is needed in specific work environments, like construction sites, specifically which over time tend to increase in number and require great numbers of workers. After the recent global financial recession that hit the international economy in the mid-2000s, recovery signs include the growing number of constructions scheduled to start in the upcoming years (Global Market Insights, 2018). A recent research by Grand View Research in 2018 supports that this market is expected to show a great progress and growth in the near future, as plans for improved infrastructure (airports, rail transport systems, roads) require new constructions sites, mainly in the UK, Indonesia, United States, India and China.

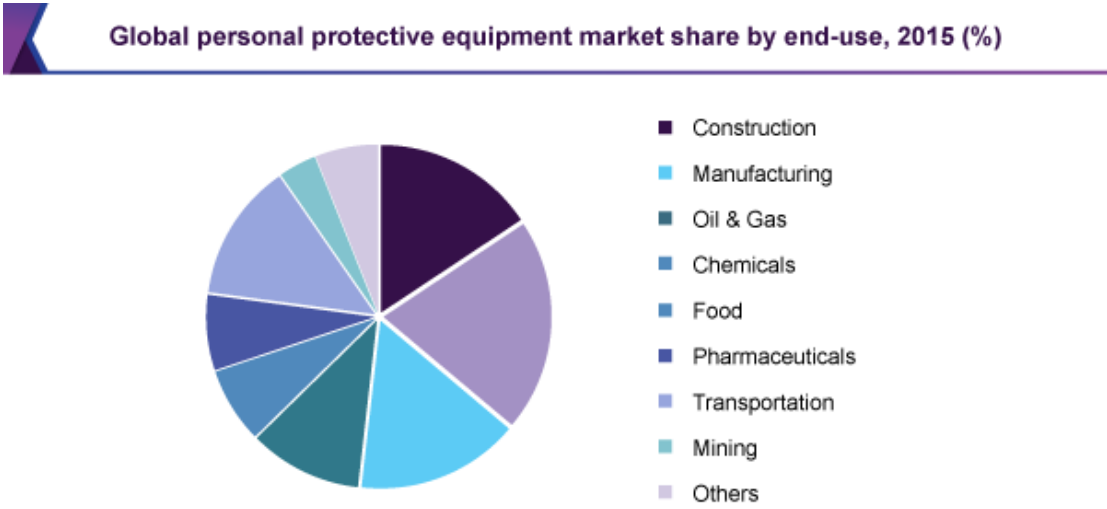
The graph below shows that the PPE market in the United States by 2015 was of \$8,84 bil. worth, which is expected to grow significantly in the next 6 years:



Graph 1: PPE market trends in the U.S.A.

Source: Grand View Research, 2018

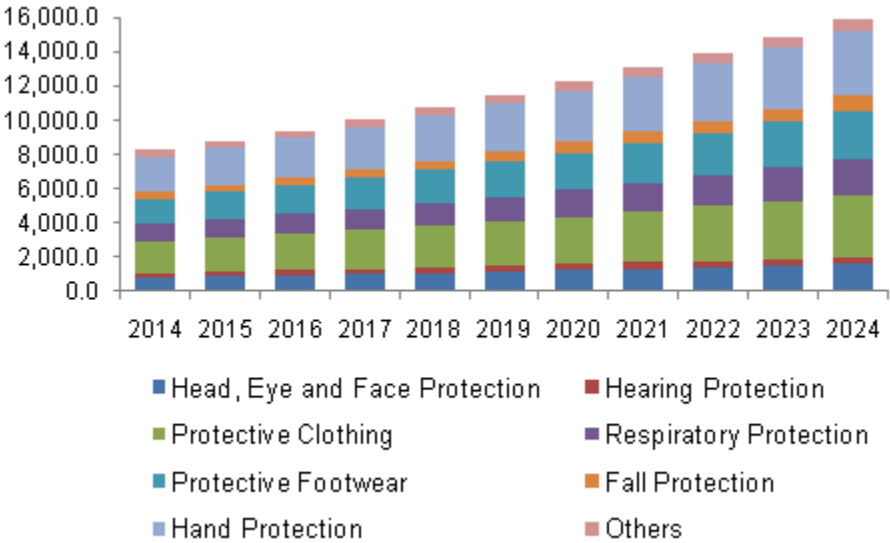
The following graph also shows that the most recent data of 2015 show that construction sites are a great source of PPE on an international basis:



Graph 2: PPE market shares by sector

Source: Grand View Research, 2018

Another interesting fact from this same research is that by equipment category, market revenue increase over time internationally:

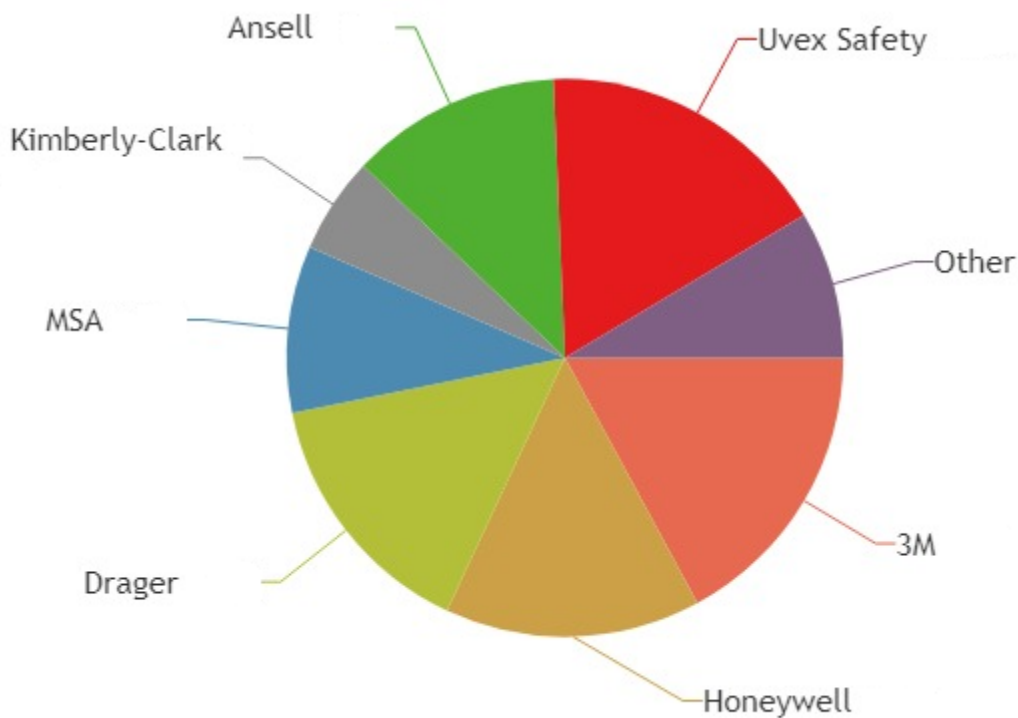


Graph 3: Global personal protective equipment (PPE) market revenue, by product, 2012 - 2022 (USD Billion)

Source: Grand View Research, 2018

Such expectations are mainly due to the aforementioned strict regulations that tend to increase in number and frequency and demand that companies improve working conditions and make employee physical welfare a top priority ([www.businesswire.com](http://www.businesswire.com), 28/07/2017). Institutions like OSHA<sup>1</sup>, NOISH<sup>2</sup> and NFPA<sup>3</sup> are nowadays trying to eliminate working injuries and death at workplace, providing thusly great potential to PPE companies worldwide (Global Market Insights, 2018).

In terms of the international industry's main competitors, the graph below shows that the greatest market shares belong to few firms of great size, like Ansell, 3M, Honeywell and Uvex Safety (Bhawsar, 13/09/2018):



Graph 4: Global players' market shares

Source: Bhawsar, 13/09/2018

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<sup>1</sup> Occupational Safety and Health Administration

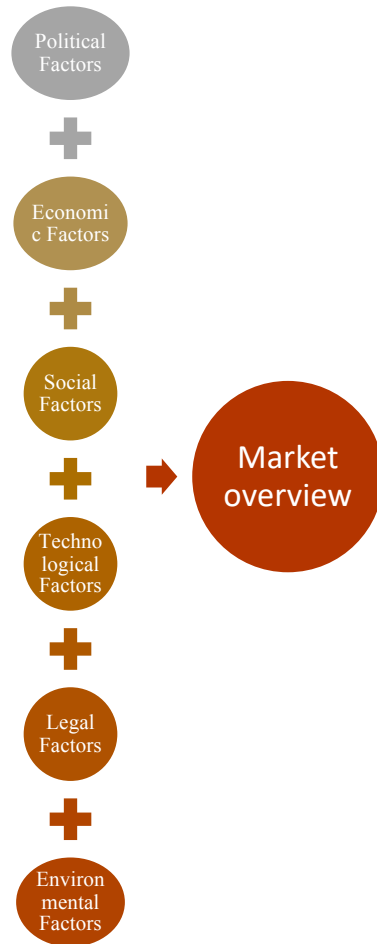
<sup>2</sup> The National Institute for Occupational Safety and Health (NIOSH)

<sup>3</sup> National Fire Protection Association

Moreover, in Greece, the PPE industry is subject to the regulatory framework and instructions published by the Hellenic Ministry of Labour and Social Affairs regarding safety and health preservation in working environments (<https://www.ypakp.gr/>). Even though the domestic market is not considered a much developed one- since there is lack of official statistic data or reports, there are a few companies of small-medium size that conduct their business mostly domestically, like Protek, Bizmarket, 3M Greece.

## **3.2 PESTLE analysis**

A widely known and used tool to better comprehend a company's macro- environment is PESTLE analysis. The latter stands for Political, Economic, Social, Technological, Legal and Environmental factors which are supposed to affect a firm's current position as well as future welfare in various ways. This method is applied by both academics and entrepreneurs in order to identify all crucial factors and characteristics that best describe the external environment the company belongs to and conducts its business within. The idea behind the conduction of such an analysis is that it provides with useful information that may lead up to new opportunities identification, as well as foresee risks that may be hidden in the industry as a whole (Luthans & Doh, 2008).



Graph 5: PESTLE factors

Source: Luthans & Doh, 2008

According to the above, PESTLE analysis for the PPE market in Europe and especially Greece (as DigiTech Safety Solutions is primarily planning at conducting its business in the Greek market) takes place below:

PESTLE analysis	
<b>Political factors</b>	<ul style="list-style-type: none"> <li>❖ Europe still suffers from serious political turbulence problems, linked to disagreements regarding the fiscal policies and monetary ones as well.</li> <li>❖ Greece's political conditions are</li> </ul>

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## Economic factors

still on the edge after the recent financial recession, causing the regulation framework to be subject to various alterations.

- ❖ In order to establish Europe as an international manufacturing and industrial power, European politicians and institutions in general promote the idea of producing innovative and qualitative products that are generated, produced and sold by Europeans.
  - ❖ Greece embraces the same idea as well; in order to promote the country's low exports, there is a great effort taking place in the recent years to promote the national entrepreneurship spirit and help companies be more innovative.
  - ❖ As mentioned above, European economy suffered from the recession that took place during the previous decade and still lingers amongst European economies. Financial conditions are still tough in many economies in the region.
  - ❖ Nevertheless, European countries are embracing the need to innovate in the industrial sectors, leading to investment expenditures to rise over time.
  - ❖ In Greece, financing and liquidity accessing is still considered a
-



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## Social factors

great problem, leading companies to choose alternative funding solutions, like business angels, in order to develop their business ideas.

- ❖ Even if this is the case, Greece finds itself in the post- Memorandum era, which enables many investments to take place especially to improve the nation's old infrastructure. This means that construction sites are expected to grow in the upcoming years.
  - ❖ Sustainability is a trend that holds in the business world in general; companies and stakeholders support sustainable business activities, which are closely linked to employee motivation.
  - ❖ Employees nowadays have become more complex to manage; they demand to be motivated to remain loyal to a company, otherwise they tend to move to job positions that best suit their personal ambitions.
  - ❖ Risk management is another important element in the modern business world; most economic sectors get much involved in eliminating risks and avoiding working accidents, leading up to promoting personal safety gear.
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**Technological factors**

- ❖ Technology and Informatics experience tremendous growth in the recent years, which in turn favor the development of innovations.
- ❖ Due to this growth speed, new technologies are easily accessed at a much lower cost than in the past. Thus, companies are able to use high technology to produce products of great quality.

**Legal factors**

- ❖ Human safety and health preservation is the focus of many regulations and guidelines. Both in Europe and in Greece, there are special legal bodies that aim at promoting the latter and develop strict legal frameworks for companies of the PPE market.
- ❖ At the same time, due to these tight frameworks, companies that require PPE in their working environments are obliged to comply with the latter, which provides PPE manufacturers with great growth opportunities.

**Environmental factors**

- ❖ As mentioned above, sustainability is a top priority in global production; companies aim at developing products that are environmental friendly and use as little resources as possible. The same holds in the PPE market; firms
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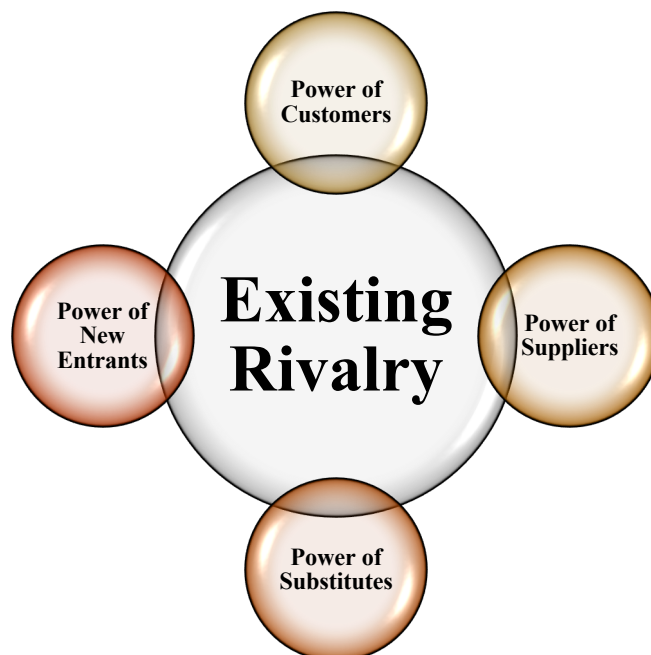
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will compete in creating safety equipment that is not hazardous, is simple and light enough and protects the best way possible.

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### 3.3 Porter's Five Forces

Another much known model is the one developed by M. Porter and concerns the identification of the power- or equally, the degree of threat- specific interested parties bare for the company under examination. Porter supports that when a firm conducts its business, there are specific groups of external players within the market that may hinder its progress, or at least play a crucial role in its overall course (Dobbs, 2014). Those are:



*Graph 6: Porter's Five Forces*

*Source: Dobbs, 2014*

For the PPE industry, Porter's model is applied below:

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## Porter's Five Forces

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### Power of Customers

- ❖ Buyers of PPE that specifically regard construction sites may refer to both the employees individually as well as their employer- a construction company. In both cases, they always tend to ask for the lowest price possible but acquire the best quality possible, which makes it quite challenging for PPE manufacturers.
- ❖ In addition, buyers' power depends a lot on the market size; great multinationals will rationally suffer from far less buyer power than small sized, domestic firms- like in Greece.
- ❖ Thus, given that Digi-Tech Safety Solutions is a new comer in the Greek PPE market, Customers' power is considered rather high.

### Power of Suppliers

- ❖ Suppliers may refer to various raw materials provision companies. However some of them- the ones that provide with the basic materials or even services to produce the goods- may cause various problems to a PPE manufacturer. Lowering the quality of the supplies or demanding for a higher price are amongst the most common ones, that in both cases cause the PPE company to lower
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its sales or profit margin respectively.

### **Power of Substitutes**

- ❖ Thus, Suppliers' power is considered rather high.
- ❖ The PPE industry offers multiple solutions to clients. Specifically when referring to construction sites, the buyer can purchase various equipment according to their personal preference or financial capability. This means that there are substitutes within the market, but when it comes to developing and launching a relevant innovative product, then such alternative solutions may seem of low quality and consequently of low preference.
- ❖ Thus, given that Digi-Tech Safety Solutions aims at launching an innovation, Substitutes' power seems medium-low.

### **Power of New Entrants**

- ❖ Even if entering such an industry may seem difficult due to high investment costs and fierce competition, nonetheless there are new entrants coming in due to their will to present with innovations and thus acquire market shares in just a little time.
- ❖ In Greece, most new comers – which is a rare phenomenon – seem to be willing to offer what

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### **Power of Existing Rivalry**

already exiting firms do, as innovation is not a trend that Greek entrepreneurs seem to master unfortunately.

- ❖ Thus, New Entrants' power seems medium- high.
  - ❖ Companies of the PPE industry constantly compete around pricing, quality and of course innovation. Rivalry has become fiercer over time, as demand rises and clients become demanding.
  - ❖ Thus, Existing Rivalry is another factor of high power.
- 

## **3.4 Basic conclusions deriving from the industry analysis**

The analysis conducted above points out some useful information concernign the market's current and upcoming needs and demands:

- ✓ PPE equipment is nowadays highly demanded because of both regulatory reforms and because companies tend to respect human rights and care more for their staff's welfare.
- ✓ Even though there are some main large PPE manufacturers worldwide, there are definetely opportunities for smaller ones to grow.
- ✓ The future seems promising, since after the global recession of the previous decade, most economies plan for infrastructure development, which it turn implies that the construction industry will surely be busy.
- ✓ In Greece, conditions seem moderate; safety garment becomes obligatory to construction sites and the latter also start showing signs of improvement, as liquidity and financial problems gradually seem to withdraw. This means that

new projects will be planned for the new future, causing PPE market's demand to grow.

- ✓ Nonetheless, competition is fierce; small size companies constantly compete to attract new clients and ensure their viability.
- ✓ In order for a small, new company to be not only viable but successful in the year to come, it has to provide the customers with a unique safety garment that will change the way they think of PPE. That means, that innovation is a crucial factor for a new entrant.
- ✓ Informatics and Technology offers great opportunities for a firm to develop innovations.
- ✓ DigiTech Safety Solutions' aims at taking great advantage of this fact and satisfy a gap identified in the market: develop an innovative product that will both serve as safety garment as well as a means of data collection that will further help prevent harm from being done.

## **4 Chapter : Marketing plan**

### **4.1 Market segmentation**

Literature states that in order for a company to develop the product the best way possible, it must take consumers' needs and requirements into consideration. It is a fact that firms sell their products when the demand for the latter grows, which leads to the rational fact that supply should always try to satisfy demand. In order for companies to be able to sell with great success, it is vital to firstly identify these characteristics and trends that hold within this market, or in other words, divide all consumers into groups of common needs and then spot the specific segment that the aforementioned products aims at serving best. This procedure is known as market segmentation and is considered a crucial step for the company to meet its target- group's demands (Orth *et al.*, 2004; Dolnicar & Lazarevski, 2009).

Moreover, in order for market segmentation to take place, literature suggests that specific criteria are applied as to make the whole procedure more efficient (Weinstein, 1994):

- **Geographic Criterion**

Geographic market segmentation is based upon geographic features, meaning that the company divides the market into geographical areas, according to the degree of business conduction. For instance, a multinational may use this criterion to divide its clientele into countries, while a domestic firm may divide the country of origin into local regions (like Northern Greece, Aegean islands etc.).

- **Demographic Criterion**

Demographic market segmentation refers at dividing the market into segments based upon specific people's characteristics. The most common demographic variables are age, gender and marital status. It is worth mentioning that most firms use this criterion as it is quite easy to comprehend and contributes greatly in better studying the segment's characteristics.

- **Psychographic Criterion**

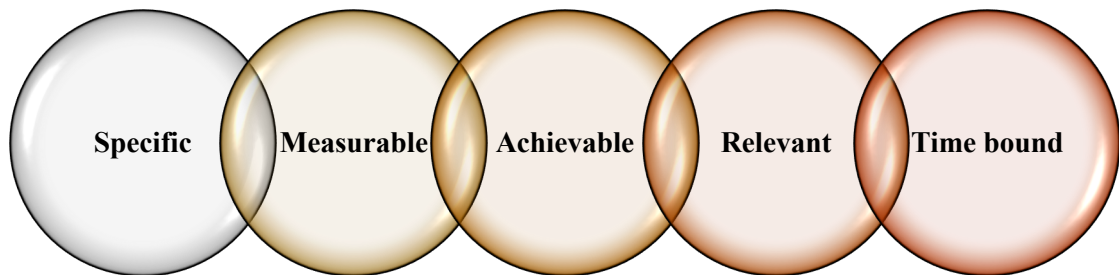
Psychographic market segmentation divides customers into segments based on social features, like their lifestyle or opinions and beliefs.

- **Behavioural Criterion**

Behavioural market segmentation divides customers into segments based on their needs, requirements, demands and even wishes and preferences.

In addition, literature states that market segmentation criteria should follow the SMART rule in order for the company to complete this procedure in an efficient way (Fuller *et al.*, 2005):





*Graph 4.1: SMART rule*

According to all the above, DigiTech Safety Solutions’ market segmentation concerning its only product, the i-helmet, is as following:

**Geographic criterion**

The company is a new one, aiming at conducting its business nationwide at the time being. Its product aims at serving construction workers all over Greece, thus the country as a whole answers to “Where”.

**Demographic Criterion**

Consumers that will express interest in buying such a product will be male (since the great majority of construction workers are men), that belong in age groups from 18 to 40 years, since human beings of such ages tend to be more technology updated and eager to purchase innovative equipment for themselves. In addition, potential customers belong in the middle-income level of citizens, in order for them

**Psychographic Criterion**

to have the financial ability to invest in such an innovative, unique equipment for their safety.

The product aims at serving construction workers, which means that clients work in the construction industry and especially in construction sites.

**Behavioral Criterion**

Potential customers are people that care for their safety, they value their health and want to maintain it at a great level. They also tend to be updated upon the market's trends and show interest in innovations when it comes to their job conduction.

Consequently, DigiTech Safety Solutions' target group is male construction workers employed in Greece, 18-40 years of age that receive a medium-scale income and are used in incorporating innovations in their everyday life- thus, get updated on current trends and adopt innovations easily as they value them worth investing in.

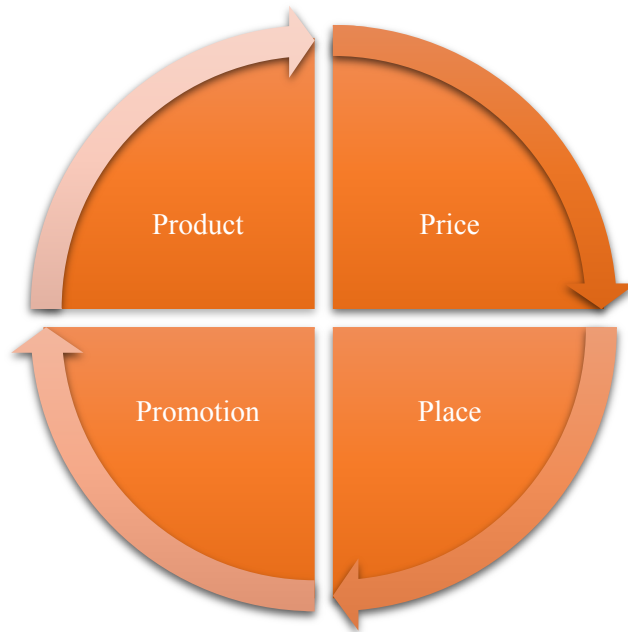
## 4.2 Marketing mix

Literature states that when a new product is developed, numerous difficulties may appear, especially on technical matters that are related to its features, the way the crowd will get updated, its pricing or how and where it will be placed and distributed. All companies face such dilemmas during the procedure of introducing the product in the market, thus the efficient resolution of such obstacles should be ensured (Martilla & James, 1977; Kreutzer, 1988). Marketing is the field that specializes in dealing with such puzzles and make the product be designed, produced and promoted the best way possible for the target group to buy it (Kreutzer, 1988).

Moreover, many academics strongly suggest that before the product is even designed, the management team should work closely with a marketer to help develop it effective-

ly. Based upon the rules of consumer behavior, the latter will actually want to purchase the product if certain qualifications are met. For product development, these refer to four basic categories of interest, also known as the 4Ps model (Van Waterschoot & Van den Bulte, 1992):

1. *Product*: the latter's main characteristics and features are fully analyzed under this category. Its purposes of use- meaning the need it aims at covering- as well as its packaging also are included here.
2. *Price*: pricing a product can prove to be a risky task; various factors can contribute in shaping the pricing strategy that ultimately the company will decide upon. The cost of production as well as all other operating costs, the competitors' pricing policies, the economic conditions that hold within the market, the target group's income level and the firm's desirable profit margin are all matters that should be taken into account.
3. *Place*: placing the product in the market in an efficient way is also vital for making it successful and boost its sales. Marketers claim that Place mostly refers to how and where the product is sold, which also may affect its pricing and the degree of desirability from the customer's point of view. This means that if the company decides in favor of a distribution intermediate, the price will rise, while if it decides to develop its own distribution channel, then there are greater margins of keeping the cost low.
4. *Promotion*: this category refers to the ways that the company will use to communicate the introduction of the product in the market with the public. The customers must be aware of its entering the market, as well as receive useful information on its use and advantages compared to other competitive products.



*Graph 4.2: The 4Ps of marketing mix*

According to all information presented above concerning the marketing mix, the 4Ps model for the i-helmet is applied below:

i-helmet 4Ps	
<b>Product</b>	The whole idea is to design an innovative helmet that will incorporate digital technology equipment within a traditional helmet that construction workers use when working at construction sites. Specifically, DigiTech Safety Solutions designed its unique helmet to carry all crucial characteristics that workers ask for when using a helmet; be weightless, bold in color, non-slippery. In order to do so, both the actual helmet's design is based upon high quality materials, as well as the digital equipment planted within the helmet is of minimum weight and volume.

Analytically, the i-helmet consists of two parts when getting produced; the helmet and the digital equipment:

- ❖ **Helmet:** The shell material is quality high density polyethylene in order to be injury safe. On its top side, the shell has 3 ventilation holes of 0,5 cm each to ensure air flow. Within the inner side, a headband of low density polyethylene is placed in order to adapt to each user's head size. From the sides, a strap of elastic quality fabric connects is used to be placed under the user's chin to maximize the helmet's stability. Moreover, at the outer side, the helmet is designed to bare a rain channel and is colored in a bold color according to the client's request. In addition, the helmet is available at three sizes; 51-55 cm, 56-60 cm and 61-65 cm. Its packaging is of recycled plastic of light blue color that bares the company's logo on the top side.
- ❖ **Digital equipment:** the firm collaborated with a digital technology specialist to develop a microchip of 0,3cm that will be planted within the helmet's outer side. The chip is inserted in a small specially designed socket of 0,4 cm width on the right side (at the level of the right ear). The chip is designed and programmed to receive various information from the user's physical features, like his walking speed, heart-beat, temperature and even blood flow,

## Price

as well as measure external conditions that hold at the time, like temperature and humidity levels. It is linked to a specially designed software database that records all such data and actually does two things at once; keep and save the data and constantly compare the current physical features to their average price and ensure they stay within the normal limits. When such metrics drop down or exceed the latter, the database informs its user to take action in order to prevent a working accident.

Pricing the product includes taking into account two metrics; the cost it requires to develop each unit as well as the profit margin the company wishes for.

- ❖ Cost per unit: DigiTech Safety Solutions faces two groups of cost; fixed and variable. The former refers to all types of expenses that need to be covered each and every month in order for the business to run properly. Such costs include telecommunication, energy, water use, cleaning and wages. The latter refers to costs related to production, like raw materials, packaging, inventory management, distribution costs and use of Informatics specialist services. In addition, extra expenses may appear which are also included in the variable cost category. All categories of cost and their sub-categories are fully analyzed in the financial section of this business plan.
- ❖ Profit margin: Literature states

that price is closely related to the stage of the life cycle that the product belongs to. At the same time, other factors, like the competitors' pricing policy or the nature of the product, as well as the existence of substitutes, may also contribute in shaping a rational profit margin (Tellis, 1986; Schindler & Schindler, 2011). In DigiTech Safety Solutions' case and specifically when it comes to the i-helmet, the firm introduces an innovative product in the Greek PPE market. In other words, the i-helmet is just entering the market (introduction stage of the life cycle theory) which on one hand means that profit margin should be kept low in order for customers to get acquainted with the product and realize its usefulness. On the other hand, it is a highly innovative product while its substitutes are plain, traditional safety gear that seem old-fashioned compared to the i-helmet. Due to its uniqueness, there are no rivals which can offer something of same value, thus DigiTech Safety Solutions may actually enjoy a high profit margin. More details will be provided in the financial section of this business plan.

## Place

As almost all PPE companies do in Greece, DigiTech Safety Solutions will sell its product directly to its customers with no intermediates involved. Specifically, in Greece there are hardly any retail shops that specialize in construction PPE,

## Promotion

thus firms that conduct their business in this industry usually sell their products through their online platform. This is what the company has decided to do; maintain such a platform to take online orders and thus keep costs down by avoiding intermediates. Distribution will be done in partnership with ELTA Couriers, which is the country's largest postal services retailer and also offered DigiTech Safety Solutions the lowest postal price and also possesses a quite developed distribution network all over the country. By this way, the customer pays the smallest possible fee to be sent the product.

Since DigiTech Safety Solutions is a new, small sized firm, funding raising is a complex matter. As will be later on analyzed, the company will use 50% of its capital from the entrepreneur's personal savings and 50% from a bank loan. Liquidity is fundamental for the company to ensure the product's high quality, since the innovation it introduces in the market should be perfect in order to attract clientele (Giudici & Paleari, 2000). Thus, there is a small proportion of capital to be invested in Promotion. In order to keep costs low, the company has decided to communicate the message of the i-helmet production via special construction events, meaning PPE exhibitions, that



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usually take place 2 times a year in Athens and Thessaloniki. In addition, the firm will advertize the product in social accounts, like Google or Facebook, as well as pay for pop-up advertisements in Greek construction sites or relevant forums.

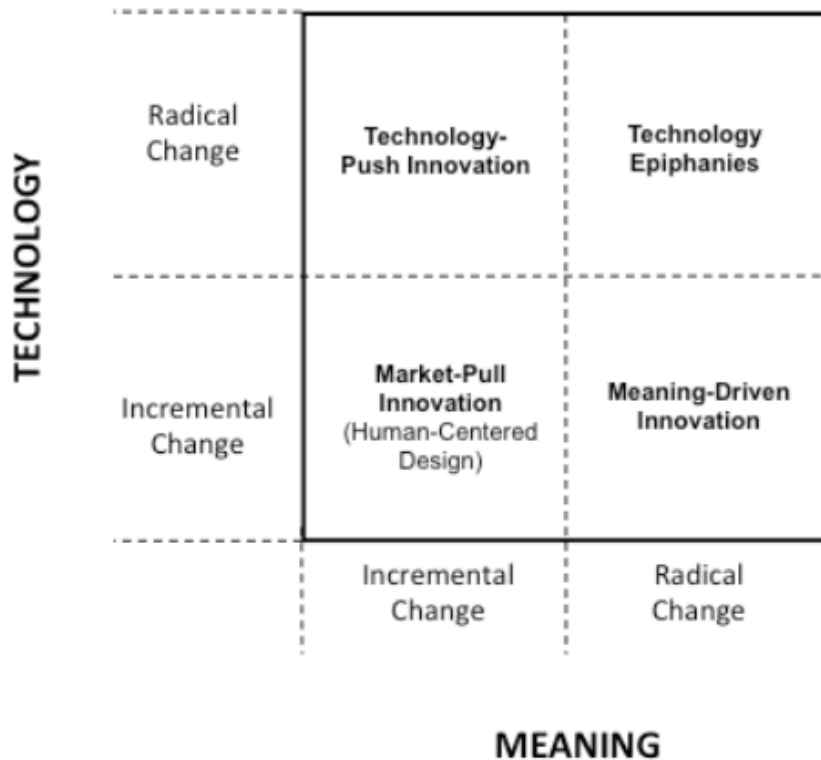
When it comes to such advertisements, the latter includes a short video that will show the i-helmet in a 3-D format, where all layers of materials (headband-digital chip- external shell) will show to provide the viewer with a close look of the product's innovation. Then, the video will focus on the chip and then show the database to which it is linked, where all information gathered by the chip will show for some seconds. Then, the company's logo and motto will appear, and the video is over.

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# 5 Chapter : Strategy- operations analysis

## 5.1 Strategy overview

Literature states that there are two types of innovation; incremental ones and radical ones. The former refers to an innovation that aims at improving an existent product's features in order to serve the need it is designed to satisfy in a more effective way. The latter refers to the development of a brand new product that will serve in a different-yet much improved- way the aforementioned need (Dewar & Dutton, 1986; Oerlemans *et al.*, 2013; Norman & Verganti, 2014). This categorization is moreover analyzed by Verganti, who developed a matrix in order to show the basic dimensions that characterize each type of innovation. His aspect is that meaning and technology shape an innovation, as different combinations of these two perspectives form different sorts of innovation:



*Graph 1: Verganti's matrix*

*Source: Norman & Verganti, 2014*

In the case of the i-helmet, technology used belongs to the high degree/ level, as well as the meaning scope, as the product aims at completely changing the way that construction workers ensure their safety and preserve their health during work. Thus, the product is characterized as a Technology Epiphany and consists a radical change. Since this fact is made clear, DigiTech Safety Solutions must apply a proper strategy in order to penetrate the market and produce accordingly.

Since a radical innovation equals introducing a brand new product within the market, the technology behind it is in fact a competitive advantage for the company (Ireland & Webb, 2007). That being said, the whole technology on which the i-helmet is developed upon consists DigiTech Safety Solutions' competitive advantage. Porter suggests that a company should choose the strategy it adopts based upon its competitive advantage as well as the range of the market it aims at promoting the product within (Dess & Davis, 1984):

<b><u>Generic Strategies</u></b>	<b>STRATEGIC ADVANTAGE</b>
----------------------------------	----------------------------

		<i>Low cost</i>	<i>Uniqueness perceived by Customer</i>
<b>MARKET TARGET</b>	<i>All over the market</i>	<b>COST LEADERSHIP</b>	<b>DIFFERENTIATION</b>
	<i>Particular Segment</i>	<b>COST FOCUS</b>	<b>DIFFERENTIATION FOCUS</b>

*Table 2: Porter’s Generic Strategies*

*Source: Dess & Davis, 1984*

According to the above table, DigiTech Safety Solutions aims at serving a particular segment of the whole PPE market (construction industry) and also presents a unique, game-changing product for this purpose. Thus, the strategy that suits the company’s case is Differentiation Focus. The latter is rather specialized, as it implies that the firm focuses on a narrow market’s needs and aims at serving them by a product based upon unique characteristics (that are not yet introduced by a rival) (Das & Joshi, 2007). This means that in order for DigiTech Safety Solutions to succeed in attracting customers and gradually acquire market shares, it must focus on the uniqueness perspective, which moreover means the company should emphasize on maintaining high quality for the i-helmet.

This fact leads to some crucial conclusions concerning the way that production and operation procedures are to be organized; the firm needs to spend more money on high quality materials to ensure the product’s durability and high digital efficiency, as well as invest in the technology department. All other types of cost should be restricted in order to permit a higher margin of the budget to be spent on the aforementioned sectors.

## **5.2 Personnel needs**

As described above, DigiTech Safety Solutions must emphasize on providing with great quality- high tech safety equipment, thus investing on the technology department/ sector

is of great importance. Given it is a new, small sized firm that deals with restricted liquidity, it is vital that it keeps costs as low as possible in order to be able to fund its innovative activities. Thus, for the first 3 years after founding, the company will hire the minimum-yet-necessary amount of people needed to conduct all business activities in the most effective way.

It is also worth mentioning that operation-speaking, there are two main parts in production; constructing the helmet and developing the digital technology that will make it “i-helmet”. Since N.K. has valuable knowledge of the first part but little experience in digital technology, the firm decided to collaborate with an external specialist company, Process Software, which will develop and produce the chip required and the software that accompanies it. Moreover, this supplier will be in charge of training the employee who will use the database and also resolve any type of technical difficulties that may arise.

For the rest of the staff members, excluding N.K. who serves as the firm’s managing director, all job position descriptions are provided below:

- *Machinery / equipment- production*: In order for the helmet to be produced, special machinery is used. The latter are designed by Branson Equipment Specialists, a Norwegian machinery producer, and require that employees with special relevant training and even previous professional experience in the field are hired. Branson Equipment Specialists have also agreed upon training the staff for the machinery’s proper usage. DigiTech Safety Solutions has already recruited these experienced employees who will be receiving training during November 2018.
- *Inventory*: the company’s warehouse/ storage space is located within the same territory leased for its production, in order for inventory to be managed. More information on the latter will be provided below. For the purpose of efficient and effective warehouse management, DigiTech Safety Solutions hired 3 employees that also have previous professional experience in Logistics.
- *Sales and Shipping*: since the company will be shipping the product directly to the buyer and no intermediates (retailers) will be included for at least the first three years (till the company manages to win a good reputation within the market and become quite profitable), an employee is hired for the sales/ distribution

department. His main duty is to receive, manage and conclude all new orders for the i-helmet.

- *Cleaning services*: the firm has hired two cleaning professionals who have worked for N.K. family business for numerous years in the past. Their duties include keeping all surfaces clean and ensure hygiene in all spaces.

The table below provides with valuable information on the number of employees each job position analyzed above requires as well as includes a brief description on the duties of each one. For the purposes of better understanding, the table includes a brief analysis of N.K.'s role in the business as well:

Job position	Number of employees	List of duties
Machinery / equipment users	5	<ul style="list-style-type: none"> <li>❖ Insert raw material in the machinery</li> <li>❖ Use the machinery and all relevant equipment to form the product</li> <li>❖ Ensure the machinery and relevant equipment works as expected</li> <li>❖ Clean input surfaces and all areas of the machinery that needs to be cleaned at the end of the afternoon shift</li> <li>❖ Keep spaces free of clutter and bring garbage in the special containers located outside of the fac-</li> </ul>

		<p>tory space</p> <ul style="list-style-type: none"> <li>❖ Keep track of raw materials used and call the warehouse to re-fill before the material is completely used up</li> <li>❖ Get informed on new orders that may have come in by the Sales-Shipping department. This is supposed to be done during the morning shift</li> <li>❖ Notify the Sales-Shipping department on every order that is ready to be shipped</li> <li>❖ Let N.K. know about any type of problems that appear during work on a daily basis by filling in a pre-designed daily report paper</li> </ul>
<p><b>Inventory – warehouse employees</b></p>	<p>2</p>	<ul style="list-style-type: none"> <li>❖ Ensure all orders coming in the warehouse are in excellent form and are stored right away</li> <li>❖ Keep track of all volumes of raw material and proceed in</li> </ul>

Sales and Shipping employees

1

new orders from suppliers to ensure that the factory has all materials needed at all times

- ❖ Write down all relevant orders from the production unit as well as the offices that may happen daily

- ❖ Keep in contact with clients and receive new orders
- ❖ Communicate with the production unit to notify them on the number of i-helmet units the clients ask for
- ❖ Get notified from the production unit for all new orders that are ready to be shipped
- ❖ Communicate with the distribution collaborator (more information will be provided below) to receive the order within the next few hours

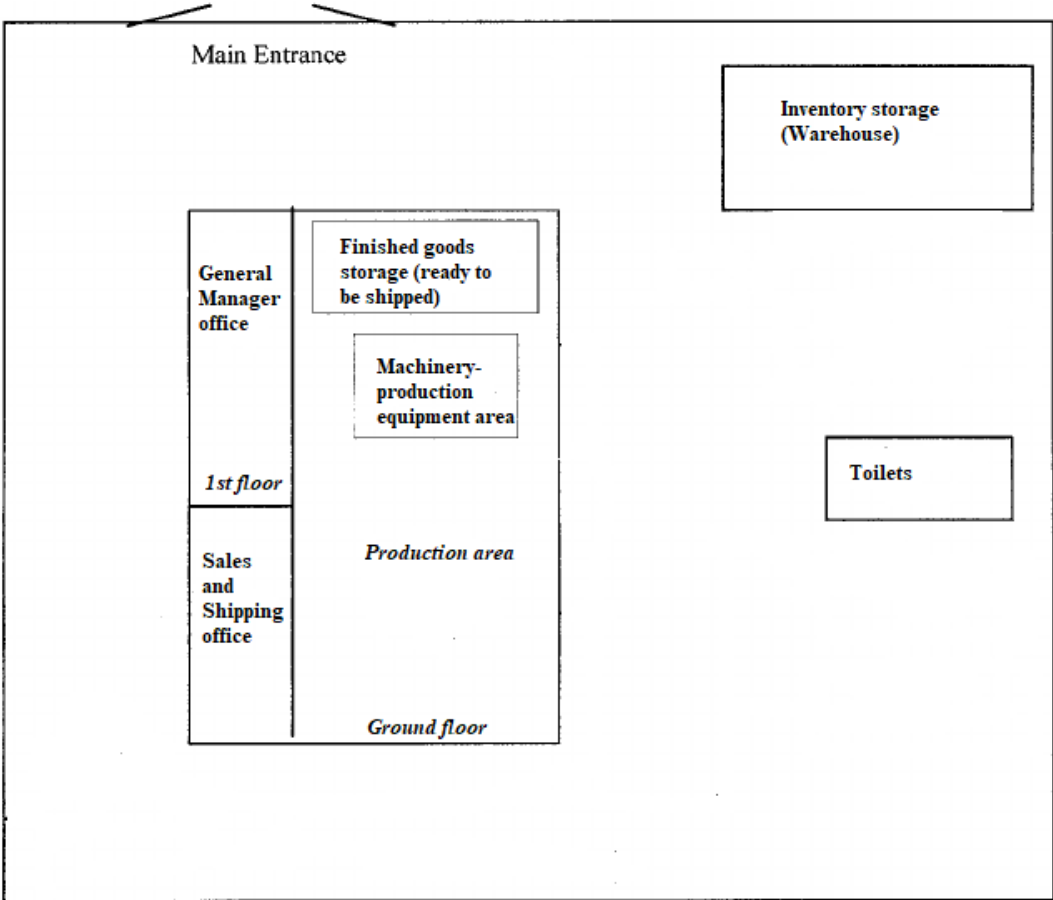


Cleaning services	2	<ul style="list-style-type: none"> <li>❖ Clean the bathroom/ toilets,</li> <li>    ❖ glasses,</li> <li>    ❖ floors,</li> <li>❖ warehouse floors and surfaces,</li> <li>❖ offices floors and surfaces.</li> </ul>
General Manager	1 (N.K.)	<ul style="list-style-type: none"> <li>❖ Keep in touch with suppliers (who are also to be further analyzed)</li> <li>❖ Be in charge of the product's marketing campaign</li> <li>❖ Be in touch with the accounting agency that helps with the company's finances</li> <li>❖ Be daily notified of any problems that arose during previous day's shifts via the daily report they fill in</li> <li>❖ Keep in touch with the employees; arrange a monthly meeting to address any significant facts and discuss their potential questions</li> </ul>

The table below provides with information on the time shifts of all employees:

Job position	Shifts per day	Number of employees
Machinery / equipment users	Morning shift: 07.00-14.00	3
	Evening shift: 14.00- 21.00	2
Inventory – warehouse employees	Morning shift: 07.00-14.00	1
	Evening shift: 14.00- 21.00	1
Sales and Shipping employees	08.00-15.00	1
Cleaning services	06.00-07.00 and 19.00-22.00	2
General Manager	08.00-15.00	1

### 5.3 Layout



## 5.4 Inventory and Distribution

In order for production to proceed smoothly and all inner procedures to be concluded daily in an efficient way, inventory is considered vital. However, the company insists on ordering and maintaining the minimum amount of each type of raw material or category of good needed for the aforementioned purposes, since a relevant excess in quantity increases the risk of inventory obsolescence or even physical damage (which moreover equals to more expenditure on the company's side of view). Thus, the table below includes all categories of supplies that both production and everyday routines require, as well as a list of all suppliers:

<b>List of materials</b>	<b>Suppliers</b>
<i>Production</i>	
<b>High density polyethylene</b>	Amco Polymers
<b>Low density polyethylene</b>	Amco Polymers
<b>Elastic fabric</b>	AUTO TEXTILE LTD
<b>Color</b>	GreekWorkshop
<b>Recycled plastic for packaging</b>	PET recycling
<b>Laser printer ink</b>	OfficePlus
<b>Digital Chip</b>	Process Software
<i>Everyday procedures</i>	
<b>Energy</b>	DEH
<b>Communications</b>	Cosmote Group
<b>Water resources</b>	Thessaloniki Water Supply & Sewerage Co. S.A (EYATH)
<b>Cleaning and hygiene supplies</b>	Cyclops S.A.
<b>Office materials</b>	OfficePlus

Concerning distribution, DigiTech Safety Solutions reached three distribution companies with national presence, ELTA (which is Greece's leader in the shipping market), ACS couriers and Speedex. The firm chose ELTA based upon two criteria; the fact that ELTA ships even to remote locations domestically as well as it offered the company the lowest shipping fares compared to the other two companies.

# 6 Chapter : Financial analysis

## 6.1 Main cost categories presentation

In order for production procedure to take place, the company needs to cover certain expenditure categories. At first, an analysis of the production cost per unit for the i-helmet is presented below:

*Table 6.1: Cost category per unit*

<b>Cost category per unit</b>	<b>Value in €</b>
<b>High density polyethylene</b>	4
<b>Low density polyethylene</b>	2
<b>Elastic fabric</b>	1
<b>Color</b>	1
<b>Recycled plastic for packaging</b>	2
<b>Laser printer ink</b>	2
<b>Digital Chip</b>	8

<b>Total Cost per unit</b>	<b>20</b>
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According to this per unit cost, the company estimates the total costs for production based upon the expected demand for the product. It should be noted, that according to the N.K. estimations, after the first month, the company will gradually acquire good fame and sales volume will grow. Thus demand is expected to increase on a moderate average rate of approximately 2% per month<sup>4</sup>:

*Table 6.2: Total production cost*

<b>2019</b>	<b>Cost per unit (€)</b>	<b>Units sold</b>	<b>Total Production Cost (€)</b>
<b>January</b>	20	100	2.000,00
<b>February</b>	20	102	2.040,00
<b>March</b>	20	104,04	2.080,80
<b>April</b>	20	106,12	2.122,42
<b>May</b>	20	108,24	2.164,86
<b>June</b>	20	110,41	2.208,16
<b>July</b>	20	112,62	2.252,32
<b>August</b>	20	114,87	2.297,37
<b>September</b>	20	117,17	2.343,32
<b>October</b>	20	119,51	2.390,19
<b>November</b>	20	121,90	2.437,99
<b>December</b>	20	124,34	2.486,75
<b>Total</b>			<b>26.824,18</b>

Except for production, based upon the categories of supplies that everyday routines require (which were presented in the previous chapter of this business plan), the table below presents with the basic operational and administrative costs that DigiTech Safety Solutions estimates it will have on a monthly basis at the very beginning of conducting business:

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<sup>4</sup> Number of units sold grows by 2% every month after January 2019.

Table 6.3: Cost category per month

Cost category per month	Value (€)
Lease of property	2.000
Wages	5.650
Energy	400
Communications	80
Water resources	150
Cleaning and hygiene supplies	70
Office materials	30
Marketing campaign expenses	70
Website maintenance expenses	50
<b>Total montly costs</b>	<b>8.500</b>

The table below provides with all types of employees salary information:

Table 6.4: Wage analysis

Wages per employee category	Number of employees	Wage per employee (€)	Value (€)
Machinery / equipment users	5	500	<b>2.500</b>
Inventory – warehouse employees	2	650	<b>1.300</b>
Sales and Shipping employees	1	650	<b>650</b>
Cleaning services	2	200	<b>400</b>
General Manager	1	800	<b>800</b>
<b>Total wages</b>			<b>5.650</b>

## 6.2 Revenue analysis

As Table 6.1 shows, it costs the company €20 to construct an i-helmet unit. In order for the firm to manage its costs and set the basis to become a profitable company in the years to come, N.K. decided to price the product at €100 per unit. Thus, given the number of products that are expected to be sold in the first 12 months and by the assumption that after the first year, sales will grow by 5% on an annual basis, the following information is provided:

*Table 6.5: Total Revenue for 2019 analysis*

<b>2019</b>	<b>Price per unit (€)</b>	<b>Units sold</b>	<b>Total Revenue (€)</b>
<b>January</b>	100	100	10.000,00
<b>February</b>	100	102	10.200,00
<b>March</b>	100	104,04	10.404,00
<b>April</b>	100	106,12	10.612,08
<b>May</b>	100	108,24	10.824,32
<b>June</b>	100	110,41	11.040,81
<b>July</b>	100	112,62	11.261,62
<b>August</b>	100	114,87	11.486,86
<b>September</b>	100	117,17	11.716,59
<b>October</b>	100	119,51	11.950,93
<b>November</b>	100	121,90	12.189,94
<b>December</b>	100	124,34	12.433,74

	2019	2020	2021
<b>Total annual sales (€)</b>	<b>134.121</b>	<b>140.827</b>	<b>147.868</b>

## 6.3 Balance Sheet and Income Statement

### 6.3.1 Balance Sheet

DigiTech Safety Solutions' financial statements for the first three years of business activities (2019-2021), as estimated given current trends, are presented below:

*Table 6.6: DigiTech Safety Solutions 2019-2021 Balance Sheet*

BALANCE SHEET (€)	2019	2020	2021
<b>ASSETS</b>			
<b>Non- Current Assets</b>	25.000	25.000	25.000
<b>Current Assets</b>	4.841	5.258	5.714
<i>Inventory</i>	2.000	2.200	2.420
<i>Accounts Receivable</i>	1.500	1.650	1.815
<i>Cash &amp; Cash Equivalents</i>	1.341	1.408	1.479



<b>TOTAL ASSETS</b>	<b>29.841</b>	<b>30.258</b>	<b>30.714</b>
<b>EQUITY &amp; LIABILITIES</b>			
<i>Equity</i>	15.000	15.000	15.000
<b>Total Equity</b>	15.000	15.000	15.000
<i>Non-Current Liabilities</i>	14.841	14.841	14.841
<i>Current Liabilities</i>	0	417	873
<b>Total Liabilities</b>	14.841	15.258	15.714
<b>TOTAL EQUITY &amp; LIABILITIES</b>	<b>29.841</b>	<b>30.258</b>	<b>30.714</b>

For better comprehension, the company provides the following information on the numbers presented above:

- Inventories and Accounts Receivable are expected to grow by an average rate of 1% on an annual basis, as production and sales volumes will grow.
- Cash & Cash Equivalents equal to annual Revenues 1%, as N.K. insists on maintaining a small amount of money accessible at all times.
- The company was funded by N.K. personal savings by €15.000 and the rest of capital needed to fund the company (€14.841) was funded by a long-term (10 year) bank loan. The latter was granted by Piraeus Bank and was agreed upon a 7% annual interest rate.
- Current Liabilities increase after the 1<sup>st</sup> year, as the company will need extra capital (in the form of short-term (1-year) bank loan by Piraeus Bank, 4% annual interest) to cover increased supplies costs.

### 6.3.2 Income Statement

In order to fully explain how Profits before Interest & Tax are estimated, the company presents the following table:

Table 6.7: Profit before Tax analysis for 2019

2019 (€)	January	February	March	April	May
<b>Revenue</b>	<b>10.000,00</b>	<b>10.200,00</b>	<b>10.404,00</b>	<b>10.612,08</b>	<b>10.824,32</b>
<b>(Cost of Goods Sold):</b>	<b>10.380,00</b>	<b>10.428,60</b>	<b>10.478,17</b>	<b>10.528,74</b>	<b>10.580,31</b>
<i>Production costs</i>	2.000,00	2.040,00	2.080,80	2.122,42	2.164,86
<i>Lease</i>	2.000,00	2.000,00	2.000,00	2.000,00	2.000,00
<i>Wages</i>	5.650,00	5.650,00	5.650,00	5.650,00	5.650,00
<i>Energy</i>	400,00	408,00	416,16	424,48	432,97
<i>Communications</i>	80,00	80,00	80,00	80,00	80,00
<i>Water resources</i>	150,00	150,00	150,00	150,00	150,00
<i>Cleaning and hygiene supplies</i>	70,00	70,00	70,00	70,00	70,00
<i>Office materials</i>	30,00	30,60	31,21	31,84	32,47
<b>Gross Profit</b>	<b>-380,00</b>	<b>-228,60</b>	<b>-74,17</b>	<b>83,34</b>	<b>244,01</b>
<i>Marketing campaign expenses</i>	70,00	70,00	70,00	70,00	70,00
<i>Website maintenance expenses</i>	50,00	50,00	50,00	50,00	50,00
<b>Profit before interest &amp; tax</b>	<b>-500,00</b>	<b>-348,60</b>	<b>-194,17</b>	<b>-36,66</b>	<b>124,01</b>

2019 (€)	June	July	August	September	October	December	Total
<b>Revenue</b>	<b>11.040,81</b>	<b>11.261,62</b>	<b>11.486,86</b>	<b>11.716,59</b>	<b>11.950,93</b>	<b>12.433,74</b>	<b>134.120,90</b>

<b>(Cost of Goods Sold):</b>	<b>10.632,92</b>	<b>10.686,57</b>	<b>10.741,31</b>	<b>10.797,13</b>	<b>10.854,07</b>	<b>10.971,40</b>	<b>127.991,38</b>
<i>Production costs</i>	2.208,16	2.252,32	2.297,37	2.343,32	2.390,19	2.486,75	<b>26.824,18</b>
<i>Lease</i>	2.000,00	2.000,00	2.000,00	2.000,00	2.000,00	2.000,00	<b>24.000,00</b>
<i>Wages</i>	5.650,00	5.650,00	5.650,00	5.650,00	5.650,00	5.650,00	<b>67.800,00</b>
<i>Energy</i>	441,63	450,46	459,47	468,66	478,04	497,35	<b>5.364,84</b>
<i>Communications</i>	80,00	80,00	80,00	80,00	80,00	80,00	<b>960,00</b>
<i>Water resources</i>	150,00	150,00	150,00	150,00	150,00	150,00	<b>1.800,00</b>
<i>Cleaning and hygiene supplies</i>	70,00	70,00	70,00	70,00	70,00	70,00	<b>840,00</b>
<i>Office materials</i>	33,12	33,78	34,46	35,15	35,85	37,30	<b>402,36</b>
<b>Gross Profit</b>	<b>407,89</b>	<b>575,05</b>	<b>745,55</b>	<b>919,46</b>	<b>1.096,85</b>	<b>1.462,34</b>	<b>6.129,52</b>
<i>Marketing campaign expenses</i>	70,00	70,00	70,00	70,00	70,00	70,00	<b>840,00</b>
<i>Website maintenance expenses</i>	50,00	50,00	50,00	50,00	50,00	50,00	<b>600,00</b>
<b>Profit before interest &amp; tax</b>	<b>287,89</b>	<b>455,05</b>	<b>625,55</b>	<b>799,46</b>	<b>976,85</b>	<b>1.342,34</b>	<b>4.689,52</b>

It must be noted that:

- Energy and office materials are expected to grow by 2% every month after January 2019, following the same pattern of increase as sales volumes.

- All other cost categories (excluding production that was analyzed before) are considered fixed ones, since the company has already proceeded to relevant contracts with its suppliers.

The following table presents with the company's Income Statement for the 2019-2021 period:

*Table 6.8: DigiTech Safety Solutions 2019-2021 Income Statement*

<b>INCOME STATEMENT (€)</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>
<b>Total Revenue</b>	<b>134.120,90</b>	<b>140.826,94</b>	<b>147.868,29</b>
<b>(Cost of Goods Sold)</b>	<b>127.991,38</b>	<b>130.551,21</b>	<b>133.162,23</b>
<b>Gross Profit</b>	<b>6.129,52</b>	<b>10.275,74</b>	<b>14.706,06</b>
<b>(Other Expenses)</b>	<b>1.440,00</b>	<b>1.440,00</b>	<b>1.440,00</b>
<b>Profit before interest &amp; tax</b>	<b>4.689,52</b>	<b>8.835,74</b>	<b>13.266,06</b>
<b>(Interest)</b>	<b>1.038,87</b>	<b>1.055,55</b>	<b>1.073,79</b>
<b>Profit before tax</b>	<b>3.650,65</b>	<b>7.780,19</b>	<b>12.192,27</b>
<b>(Tax)</b>	<b>1.095,19</b>	<b>2.334,06</b>	<b>3.657,68</b>
<b>Net Profit</b>	<b>2.555,45</b>	<b>5.446,13</b>	<b>8.534,59</b>

The following are noted to explain the numbers estimated above:

- Cost of Goods Sold is expected to grow also by 2% on an annual basis, following the Revenue increase pattern.
- Other Expenses refer to Marketing campaign and Website maintenance.
- Interest is estimated as 7% of Non- Current Liabilities of each year, as well as an added 4% of Current Liabilities for 2020 and 2021 respectively.
- Tax is estimated as 30% of Profit before Tax, as is customary to be done so in most industries in Greece.

# 7 Chapter : Statistical analysis

## 7.1 Introduction

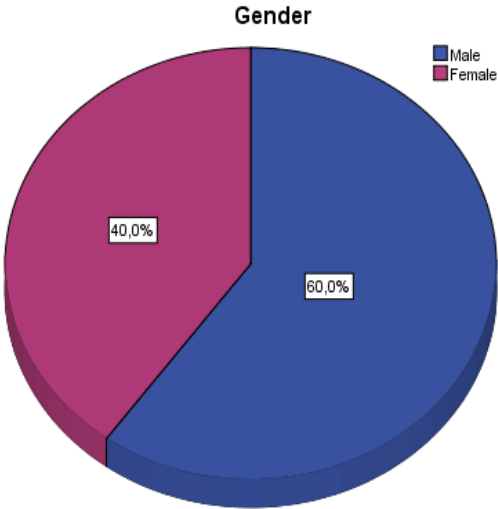
In order to obtain specific results for this master thesis, a research was conducted about the acceptability of innovative safety equipment in various companies. The main questions of the research are described in detail below:

- 1) How important is the necessary equipment for workers in high-danger jobs?
- 2) What kind of weight is appropriate for such equipment according to the workers who will use it?
- 3) Is it necessary for this innovative product to provide useful information about the workers' physical characteristics and any sign of discomfort?
- 4) Are the workers willing to buy such an equipment in order to ensure safety during their work?
- 5) Which price would be ideal for the workers to pay in order to obtain an innovative individual safety gear of high efficiency?
- 6) In what degree the demographic characteristics of workers, such as gender, age, educational level, family status, income level and years of working experience affect their answers in the previous questions?

## 7.2 Methodology of research

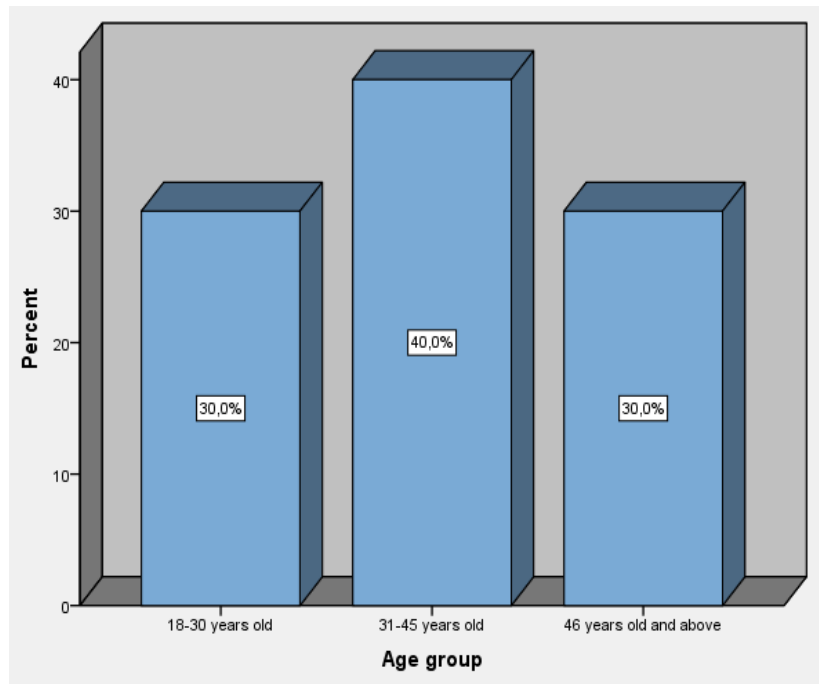
### 7.2.1 Description of the sample

In this paragraph we present the main demographic features of the 200 workers who participated in this research. They are workers in Greek companies with various activities and of high risk. Initially, the workers were asked about their gender. There were 120 men and 80 women in this research. The corresponding percentages are presented in Figure 1.



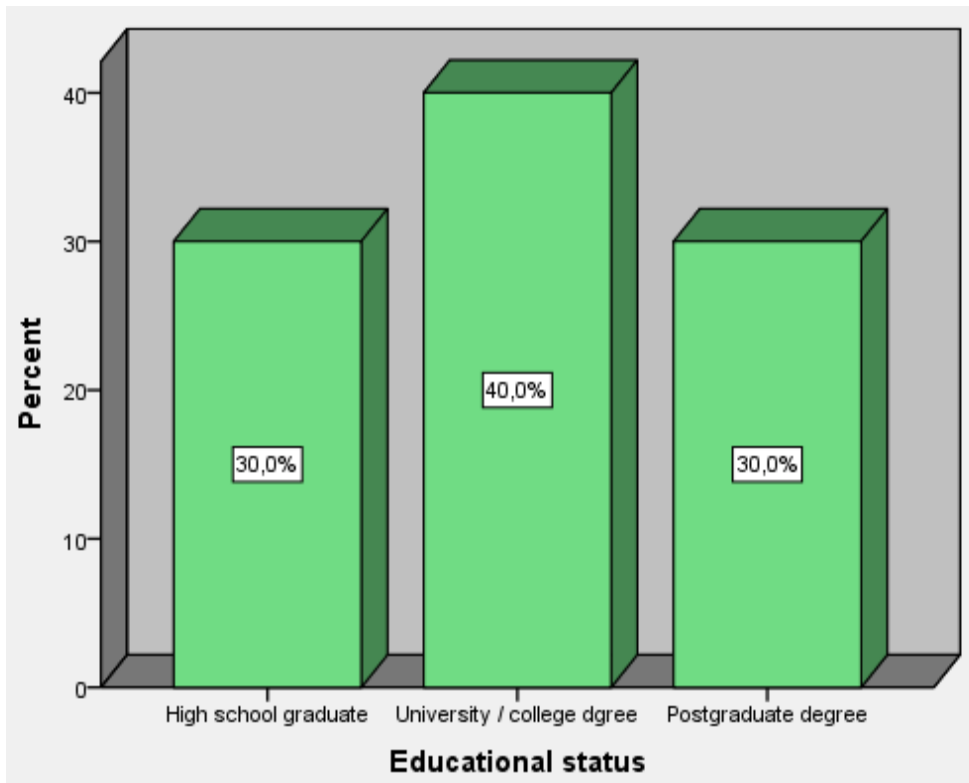
*Figure 1: Participants' distribution according to their gender.*

The next demographic feature is the age group (Figure 2). The majority of the sample comes from the middle age group (31-45 years old) with 80 people. However, the frequencies of the two other age groups are quite important (60 people from each group).



*Figure 2: Participants' distribution according to the age group they belong to.*

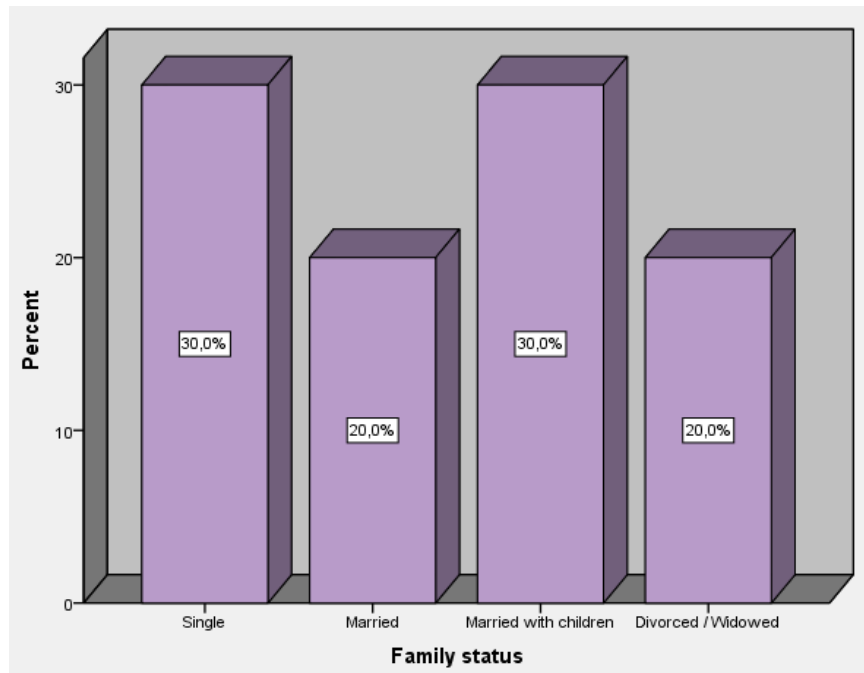
The third characteristic to be examined is the educational level. As it can be seen in Figure 3, most of the participants are holders of a university or college degree. The remaining of the sample is equally divided between high school graduates and holders of a postgraduate degree (60 individuals in each category).



*Figure 3: Participants' distribution according to their educational status.*

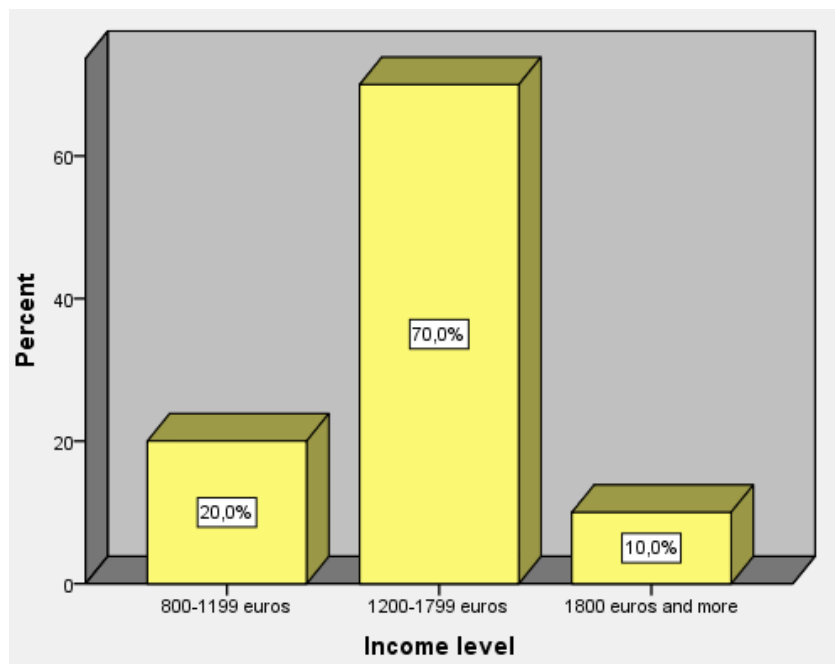
Furthermore, the participants were asked to answer about their family status. The percentage of each category is shown in the next figure (Figure 4). It is obvious that the dominant percentages refer to single people and married with children (60 people in each category). Additionally, there was a significant amount of married and divorced or widowed (80 individuals cumulatively).





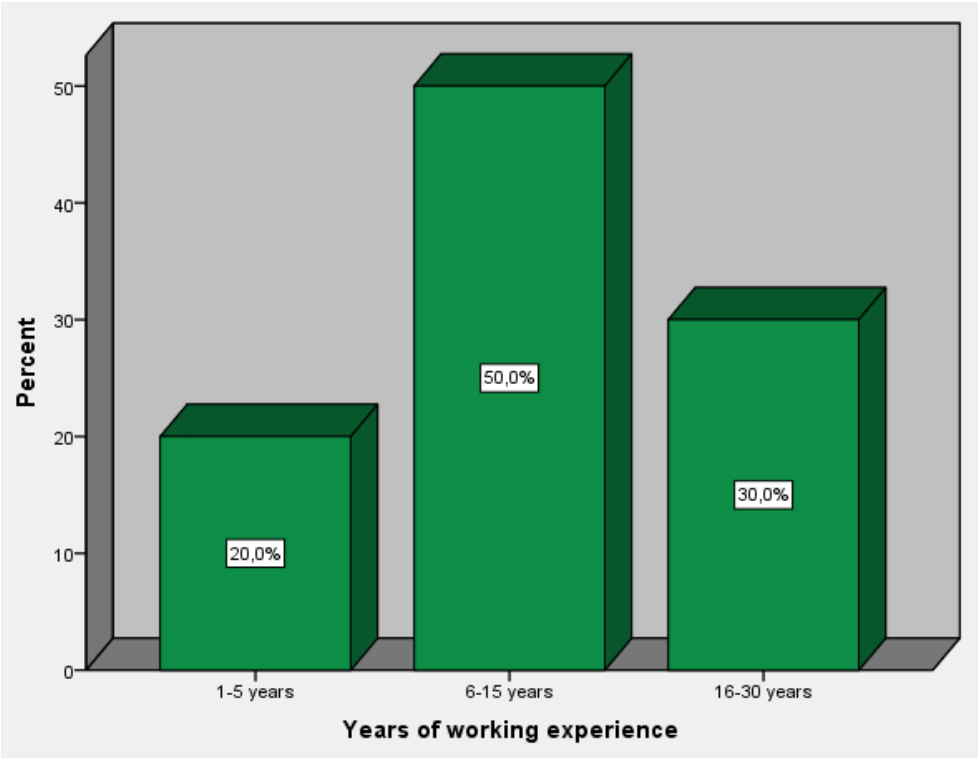
*Figure 4: Participants' distribution according to their family status.*

The income level is the next characteristic to be examined (Figure 5). More than 50% of the participants of the survey declared that they earn 1200-1799 euros per month (140 people). Only 20 people earn 1800 euros or more while the income of the others does not exceed 1199 euros per month.



*Figure 5: Participants' distribution according to their income level.*

The last demographic feature in this research was the years of working experience. As it can be seen in Figure 6, half of the participants have worked for 6-15 years. There were 60 people who answered 16-30 years while the others have not worked more than 5 years.



*Figure 6: Participants' distribution according to their working experience.*

**7.2.2 Description of the questionnaire**

The tool of this research was a questionnaire divided in two parts. The first part contains 6 demographic features described in detail in the previous paragraph. The next part contains 8 questions related with the main topic examined in this survey, the utility of an innovative safety gear. The participants were asked to answer about the desirable characteristics of this product and their willingness to use such a product. All the questions

are closed type with 5 possible answers in each question except the last which has only 4 different answers.

### **7.2.3 Methods of the statistical analysis**

In this paragraph we describe the statistical methods used in this master thesis in order to extract useful conclusions from the participants' answers. All the statistical measures and tests described below are parts of the SPSS 23 (Statistical Package for Social Services).

First of all we present some useful descriptive measures (minimum and maximum value, mean value, standard deviation) of the participants' answers in the main questions of the research (Dancey et al., 2017). For the last question we compute the frequency of each answer and the corresponding percentage.

The next step is to conduct inductive tests so as to discover any significant differences in the participants' answers according to their demographic features. The gender was the only demographic feature with two possible answers (male and female) and according to this the participants are divided in 2 independent samples. The most suitable test for this case is the t test for 2 independent samples which examines the null hypothesis  $H_0$ : the mean value is equal in the 2 groups versus the alternative hypothesis  $H_1$ : the 2 groups perform statistically significant difference in the mean values of their answers. However, this test gives reliable outcomes only if the data in each sample are normally distributed. (Field, 2009). If this assumption is violated, then the non-parametric Mann-Whitney test will be used. In this test we check the median of the two populations instead the mean values. Because of their inductivity (these tests provide outcomes from the sample for the total population) the tests do not always provide correct outcomes (Field, 2009). The margin of error, known as level of significance, is defines as 5% in each test.

If the conditions of the t-test for 2 independent samples are satisfied, then the test provides 2 possible values depending on the equality of variances between the 2 samples. The equality of variances is checked with Levene's test. This test examines the null hypothesis  $H_0$ : the variances of the 2 populations are equal against the alternative hypothesis  $H_a$ : the variances are significantly different. The level of significance is 5%. (Field, 2009).

The normality of data can be checked through the Kolmogorov-Smirnov test which examines the null hypothesis  $H_0$ : the data are normally distributed against the alternative hypothesis  $H_1$ : the distribution of the data perform statistically significant difference from the normal (Field, 2009). The level of significance is 5%. However, the normality of data can be assumed to be valid if the size of the sample is sufficiently large meaning to contain more than 30 people (Field, 2009).

The other demographic features examined in the present research have more than two possible answers. Consequently, the sample is divided in 3 or more independent samples. The suitable test for this case is the Analysis of Variance (ANOVA) which examines the null hypothesis  $H_0$ : the mean values of the populations, the samples originate from, have approximately the same mean value against the alternative hypothesis  $H_1$ : there is at least one mean value which performs statistically significant difference from the others. The main conditions to obtain reliable outcomes of this test is the normality, homoscedasticity and independency of the residuals. (Field, 2009, 348-361) If more or more of the conditions are violated, then ANOVA is replaced with the non-parametric Kruskal-Wallis test (Field, 2009). The level of significance in each test is 5%.

Another test implemented for the purposes of this research is chi-square test for independency between categorical variables. This test examines the null hypothesis  $H_0$ : the variables are independent against the alternative hypothesis  $H_1$ : the variables have statistically significant correlation. However, this test provides reliable outcomes only if the predicted values of the variables are higher than 5. If this condition is violated, the Monte Carlo method will be run against the chi-square test. (Field, 2009).

### **7.3 Outcomes of the research**

In this paragraph we present the main outcomes of the descriptive and inductive statistics for the individual safety gear. In the next table (Table 1), the main statistical measures of the participants' answers are fully described in order to extract some useful conclusions. In the first question there are 5 possible answers coded as follows: Not at all (1), A little (2), At a normal degree (3), Very hard (4), Too hard (5). The next 5 questions perform the same 5 possible answers coded as: Not at all (1), A little (2), At a normal degree (3), Much (4), Very much (5). The last question refers to the desirable weight of the innovative product described in the research. The participants were asked

to choose one of the 5 following answers: Not at all heavy (1), A little heavy (2), At a normal degree heavy (3), Very heavy (4), Too heavy (5).

As it can be seen in the Table 1, most of the participants consider that the working conditions of their job are very hard or at a normal degree (M=3.50, S.D=0.808). None of them chose the first answer (Not at all) whereas there were employees who chose the last answer (Too hard). The next 5 questions perform approximately the same mean value of the answers except the first one which refers to the existence of the necessary equipment in the company the employees work for. In this question, the participants answered, at a large degree, that the company provides them the necessary safety equipment at a low or normal degree (M=2.80, S.D=0.874)). It can be seen that none of them chose the first answer (Not at all) in any question of this group. It is important to note that the majority of the employees answered that they would be willing at a high or very high degree to use the appropriate safety equipment (M=4.10, S.D=0.946). Additionally, they are consent to exist an official database with information about their physical characteristics during the work (M=4.10, S.D=1.047) and any signs of discomfort and potential loss of consciousness (M=4.40, S.D=0.665). However, the employees answered, on average, they are willing to personally buy this equipment at a normal degree or very much (M=3.90, S.D=0.833).

*Table 1: Descriptive measures of the participants' answers in the main questions of the research*

Questions	Minimum value	Maximum value	Mean value	Standard deviation
To what degree do you believe that working conditions may be harmful for your health and overall welfare?	2	5	3,50	0,808
To what degree do you think that the company you are working for provides with the necessary equipment to guarantee your safety?	2	4	2,80	0,874

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To what degree would you be willing to use new technology / innovative equipment to maximize your health and safety during work?	2	5	4,10	0,946
Given that the company you work for keeps a “smart” database linked to such an innovative gear, to what degree do you find it important that such an equipment could send the database information on physical characteristics during work, like body temperature or heart beat?	2	5	4,10	1,047
Is it important to you if such an equipment could immediately notify an official database (that the company you work for keeps) when specific physical characteristics show signs of discomfort and potential loss of consciousness?	3	5	4,40	0,665
To what degree would you personally be willing to buy such an equipment?	2	5	3,90	0,833
Please choose the most appropriate answer related to your personal opinion concerning such an innovative product’s weight	1	3	1,90	0,833

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The last question the participants were asked to answer refers to the price they are willing to pay in order to buy such an individual safety gear of high efficiency. The majority of them (90%) answered they are willing to pay a price in a range from 50 to 139 euros. Only 20 people claimed that they would pay over than 140 euros for such a innovative safety product.

After the description of the participants’ answers, inductive tests were implemented in order to explore if the demographic features have statistically significant influence in the answers the participants gave. For the first 7 questions we checked if there is statistically significant difference in the mean values or medians of the different populations the samples derived from. The last question was examined through chi square test to

discover any significant correlation between the participants' answers and their demographic characteristics.

The first table in the Appendix (Table 1) refers to the participants' gender. The normality of data, in each sample, can be assumed as their sample is sufficiently large (120 men and 80 women). For this reason, the t-test for 2 independent samples was performed to check if the mean values in the 2 groups perform any significant difference. As it can be seen, the gender perform statistically significant influence in all the participants' answers. Specifically, men and women's opinion significantly differs regarding to the conditions in their working environment ( $t(198)=-3.683$ ,  $p=0.000$ ), the existence of necessary safety equipment in the company they work for ( $t(135.759)=-2.532$ ,  $p=0.012$ ), their willingness to use safety equipment ( $t(92.945)=3.827$ ,  $p=0.000$ ) and the desirable weight of such an innovative safety gear ( $t(198)=2.098$ ,  $p=0.037$ ). It is obvious that women are more pleased from their working conditions than men and with the necessary equipment they take from the company they work for. On the other hand, men are more willing than women to use such an innovative safety gear.

Furthermore, the two groups perform significantly different answers regarding to the existence of a program inside the gear to send information on physical characteristics during work ( $t(113.700)=3.616$ ,  $p=0.000$ ) and notify any signs of discomfort and potential loss ( $t(117.211)=2.405$ ,  $p=0.018$ ). Men and women also differ in their opinion about the most appropriate price for this product ( $t(108.681)=1.872$ ,  $p=0.064$ ). Specifically, men consider in a larger degree than women that the aforementioned information should be contained in the program of the gear. Additionally, men are more content to pay a higher price to obtain this safety equipment than women and they are more willing to use a relatively heavy kind of equipment.

The second feature to be examined is the age group. There are 3 samples originated from this demographic feature (60 people from 18 to 30 years old, 80 people from 31 to 45 years old and 60 people at least 61 years old). The conditions to perform the Analysis of Variance are not all satisfied, so the non-parametric Kruskal-Wallis test was performed in order to find any statistically significant difference between the median of the different age participants' answers. The outcomes are given in the Table 2 in the Annex. However, it cannot be obvious the source of any statistically significant difference because of the structure of this test.

As it can be seen in the Table 2 of the Appendix, the different age groups perform statistically significant difference in their answers. They have different opinions about the hard conditions in their working environment ( $\chi^2(2) = 26.476$ ,  $p=0.000$ ), the provision of any necessary equipment from their company ( $\chi^2(2) = 78.593$ ,  $p=0.000$ ) and their willingness to use new technology / innovative equipment to maximize their health and safety during work ( $\chi^2(2) = 32.881$ ,  $p=0.000$ ). Additionally, the different age groups do not consider, at the same degree, important for their equipment to send their physical characteristics ( $\chi^2(2) = 23.889$ ,  $p=0.000$ ) and any signs of discomfort ( $\chi^2(2) = 25.305$ ,  $p=0.000$ ). Their desire to buy such an innovative product is another topic of disagreement ( $\chi^2(2) = 37.473$ ,  $p=0.000$ ). The weight of the product is the last sentence which the participants gave significantly different opinions depending on their age group.

The next demographic feature to be examined is the educational status. This feature divides the sample in 3 independent samples (60 high school graduates, 80 university or college graduates and 60 holders of a postgraduate degree). The assumptions of Analysis of Variance are not all satisfied. For this reason, the non-parametric Kruskal-Wallis test was performed. As it can be seen in the Table 3 in the Appendix, the 3 groups perform statistically significant differences between all the questions that were aforementioned for the age.

Specifically, people from different education levels perform different opinion about the hardness of the working environment conditions ( $\chi^2(2) = 51.180$ ,  $p=0.000$ ) and the provision of the necessary equipment to ensure their safety ( $\chi^2(2) = 78.889$ ,  $p=0.000$ ). Additionally, they seem to have disagreement about their willingness to buy such an innovative product on their own ( $\chi^2(2) = 45.747$ ,  $p=0.000$ ). The weight of the product ( $\chi^2(2) = 41.910$ ,  $p=0.000$ ) and the existence of an official database for this product to send any useful information about the participants' characteristics ( $\chi^2(2) = 38.733$ ,  $p=0.000$ ) and any suspicion of discomfort ( $\chi^2(2) = 25.304$ ,  $p=0.000$ ) are 3 more topic of statistically significant dispute among people originate from different education levels. Last but not least, the participants' willingness to buy this new product seems to be significantly different depending on their education level ( $\chi^2(2) = 37.473$ ,  $p=0.000$ ).

However, the analysis could not be more specific to find the source of any difference because of the structure of this test.

The fourth demographic feature of the research is the family status (Table 4 in the Appendix). The participants are divided into singles (60 people), married (40 people), mar-



ried with children (60) and divorced or widowed (40 people). From their answers, it seems they have significantly different opinion about their working environment ( $\chi^2(3) = 106.591$ ,  $p=0.000$ ), the existence of necessary equipment for their safety ( $\chi^2(3) = 166.899$ ,  $p=0.000$ ) and their willingness to use an innovative equipment with the aim of their own safety ( $\chi^2(3) = 115.054$ ,  $p=0.000$ ). The weight of the product is another question with significantly different answers among the four aforementioned groups ( $\chi^2(3) = 142.594$ ,  $p=0.000$ ). The other differences refer to the importance of this equipment to send information about the holders' physical characteristics ( $\chi^2(3) = 108.314$ ,  $p=0.000$ ) and in any case of discomfort ( $\chi^2(3) = 80.337$ ,  $p=0.000$ ). The last question refers to the willingness of the participants to buy such an innovative product ( $\chi^2(3) = 131.638$ ,  $p=0.000$ ).

Apart from the previous characteristics, it is of much importance to examine if the income level significantly affect the participants' answers in the main questions of this research. This is the fifth inductive test. Its outcomes are included in the Table 5 in the Appendix. There are three different groups according to this demographic feature: people who earn 800-1199 euros per month (40 individuals), people with monthly income in the level of 1200 to 1799 euros (140 individuals) and people who earn 1800 euros or more per month (20 individuals). The non-parametric Kruskal-Wallis test was performed as the assumptions of Analysis of Variance are not all satisfied.

As it can be seen, the working conditions ( $\chi^2(2) = 76.904$ ,  $p=0.000$ ), and the provision of the necessary safety equipment ( $\chi^2(2) = 44.877$ ,  $p=0.000$ ) are both topics with statistically significant difference in the opinion of participants with different income level. Their willingness in use such an innovative equipment is another topic of disagreement ( $\chi^2(2) = 8.627$ ,  $p=0.013$ ). Another issue of dispute is the necessary weight of the product ( $\chi^2(2) = 10.685$ ,  $p=0.005$ ). Furthermore, the participants disagree about the suitable software in this equipment in order to send useful information in a database about the user's physical characteristics ( $\chi^2(2) = 6.014$ ,  $p=0.049$ ) and any sign of weakness and potential loss of consciousness ( $\chi^2(2) = 13.109$ ,  $p=0.001$ ). The last question, with significantly different opinions among the participants, refers to their willingness to buy such an innovative individual safety gear of high efficiency ( $\chi^2(2) = 31.734$ ,  $p=0.000$ ).

The last demographic feature to be examined is the years of working experience. The outcomes of the Kruskal-Wallis test are shown in the Table 6 in the Appendix. This characteristic, as the previous ones, seems to significantly affect the participants' opin-

ion about different topics associated with the innovative individual safety gear. Before the analytical presentation of these cases, we have to note that the participants are divided in 3 discrete groups according their years of working experience: 1-5 years (40 people), 6-15 years (100 people) and 16-30 years (60 people).

The working conditions ( $\chi^2(2) = 72.761$ ,  $p=0.000$ ), the existence of the necessary equipment ( $\chi^2(2) = 44.443$ ,  $p=0.000$ ) and the participants' willingness to buy such an innovative product ( $\chi^2(2) = 11.345$ ,  $p=0.003$ ) are the first three cases where the working experience significantly differentiate their answers. The desirable weight of the product ( $\chi^2(2) = 23.036$ ,  $p=0.000$ ) is the fourth case of statistically significant difference among people with different working experience. The next two questions refer to the importance of an official database for messages about the physical characteristics ( $\chi^2(2) = 12.733$ ,  $p=0.002$ ) or signs of discomfort ( $\chi^2(2) = 23.315$ ,  $p=0.001$ ) originated from the innovative individual safety gear. Finally, the participants seem to have significantly different opinions about their willingness to buy this product on their own ( $\chi^2(2) = 45.662$ ,  $p=0.049$ ).

The last inductive test was performed, is the chi-square for independence between the price levels the participants would be more willing to pay for this product and a demographic feature each time. As it can be seen in the Table 7 in the Appendix, the demographic features significantly affect the participants opinion about the desirable price levels of this product.

## 7.4 Conclusions

From the previous statistical analysis of the participants' answers, some useful conclusions have been extracted:

- 1) People of different professions consider that their company does not give, at a large degree, the necessary equipment and the working conditions are often hard.
- 2) People are extremely positive with the probability of constructing such an innovative product to give information in an official database about the physical characteristics and any signs of discomfort.

- 3) Workers from different companies related to high risk jobs replied they are willing to use an innovative product that ensures their safety but they are less willing to buy it on their own.
- 4) Additionally, the workers consider the weight of such an innovative individual gear should not be more than normal levels.
- 5) Men are more willing than women to use this safety product and are consent for a high price in order to buy this product. Furthermore, men consider it more important than women the existence of information about their physical characteristics and any sign of discomfort. On the other hand, women replied they are more pleasant than men from the safety they are provided with from the company and the necessary equipment. Also, they prefer a heavier equipment than men.
- 6) The participants' age, educational level, income level, family status and working experience are additional factors that significantly differentiate the workers' answers about the product.
- 7) Finally, all the demographic features significantly influence on the participants' answers about the price levels they consider more acceptable for such an innovative safety equipment.

## **7.5 Discussion**

From the above analysis is it obvious that workers in companies of high risk are willing at construction of an innovative product about their safety. The next step in the research should be a more detailed description of the desirable characteristics according to the workers. Another topic of great interest should be the research in specific kind of companies as to obtain useful outcomes of the necessity of this product regarding to the kind of the company.

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# 8 APPENDIX

## APPENDIX

**Table 1**

*Outcomes of the t-test for 2 independent samples according to the participants' gender*

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Questions	Mean values (men – women)	Value of the test	p- value*
To what degree do you believe that working conditions may be harmful for your health and overall welfare?	3,33 – 3,75	-3,683	<b>0,000</b>
At what degree do you think that the company you are working for provides with the necessary equipment to guarantee your safety?	2,67 – 3,00	-2,532	<b>0,012</b>
At what degree would you be willing to use new technology / innovative equipment to maximize your health and safety during work?	4,33 – 3,75	3,827	<b>0,000</b>
Please choose the most appropriate answer related to your personal opinion concerning such an innovative product's weight.	2,00 – 1,75	2,098	<b>0,037</b>

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Given that the company you work for keeps a “smart” database linked to such an innovative gear, to what degree do you find it important that such an equipment could send the database information on physical characteristics during work, like body temperature or heart beat?	4,33 – 3,75	3,616	<b>0,000</b>
Is it important to you if such an equipment could immediately notify an official database (that the company you work for keeps) when specific physical characteristics show signs of discomfort and potential loss of consciousness?	4,50 – 4,25	2,405	<b>0,018</b>
To what degree would you personally be willing to buy such an equipment?	4,00 – 3,75	1,872	<b>0,064</b>

\*If p-value is lower than 0.05, then the null hypothesis of the test is rejected, meaning that participants from different sample perform statistically significant differences in their opinions.

**Table 2**

*Outcomes of the t-test for 2 independent samples according to the participants' age*

Questions	Value of the test	p-value*
To what degree do you believe that working conditions may be harmful for your health and overall welfare?	26,476	<b>0,000</b>
At what degree do you think that the company you are working for provides with the necessary equipment to guarantee your safety?	78,593	<b>0,000</b>
At what degree would you be willing to use new technology / innovative equipment to maximize your health and safety during work?	32,881	<b>0,000</b>

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Please choose the most appropriate answer related to your personal opinion concerning such an innovative product's weight.	68,984	<b>0,000</b>
Given that the company you work for keeps a "smart" database linked to such an innovative gear, to what degree do you find it important that such an equipment could send the database information on physical characteristics during work, like body temperature or heart beat?	23,889	<b>0,000</b>
Is it important to you if such an equipment could immediately notify an official database (that the company you work for keeps) when specific physical characteristics show signs of discomfort and potential loss of consciousness?	25,305	<b>0,000</b>
To what degree would you personally be willing to buy such an equipment?	37,473	<b>0,000</b>

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\*If p-value is lower than 0.05, then the null hypothesis of the test is rejected, meaning that participants from different sample perform statistically significant differences in their opinions.

**Table 3**

*Outcomes of the t-test for 2 independent samples according to the participants' education level*

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<b>Questions</b>	<b>Value of the test</b>	<b>p-value*</b>
To what degree do you believe that working conditions may be harmful for your health and overall welfare?	51,180	<b>0,000</b>
At what degree do you think that the company you are working for provides with the necessary equipment to guarantee your safety?	78,889	<b>0,000</b>
At what degree would you be willing to use new technology / innovative equipment to maximize your health and safety during work?	45,747	<b>0,000</b>

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Please choose the most appropriate answer related to your personal opinion concerning such an innovative product's weight.	41,910	<b>0,000</b>
Given that the company you work for keeps a "smart" database linked to such an innovative gear, to what degree do you find it important that such an equipment could send the database information on physical characteristics during work, like body temperature or heart beat?	38,733	<b>0,000</b>
Is it important to you if such an equipment could immediately notify an official database (that the company you work for keeps) when specific physical characteristics show signs of discomfort and potential loss of consciousness?	25,305	<b>0,000</b>
To what degree would you personally be willing to buy such an equipment?	37,473	<b>0,000</b>

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\*If p-value is lower than 0.05, then the null hypothesis of the test is rejected, meaning that participants from different sample perform statistically significant differences in their opinions.

**Table 4**

*Outcomes of the t-test for 2 independent samples according to the participants' family status*

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<b>Questions</b>	<b>Value of the test</b>	<b>p-value*</b>
To what degree do you believe that working conditions may be harmful for your health and overall welfare?	106.591	<b>0,000</b>
To what degree do you think that the company you are working for provides with the necessary equipment to guarantee your safety?	166.899	<b>0,000</b>
At what degree would you be willing to use new technology / innovative equipment to maximize your health and safety during work?	115.054	<b>0,000</b>

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Please choose the most appropriate answer related to your personal opinion concerning such an innovative product's weight.	142.594	<b>0,000</b>
Given that the company you work for keeps a "smart" database linked to such an innovative gear, to what degree do you find it important that such an equipment could send the database information on physical characteristics during work, like body temperature or heart beat?	108.314	<b>0,000</b>
Is it important to you if such an equipment could immediately notify an official database (that the company you work for keeps) when specific physical characteristics show signs of discomfort and potential loss of consciousness?	80.337	<b>0,000</b>
To what degree would you personally be willing to buy such an equipment?	131.638	<b>0,000</b>

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\*If p-value is lower than 0.05, then the null hypothesis of the test is rejected, meaning that participants from different sample perform statistically significant differences in their opinions.

**Table 5**

*Outcomes of the t-test for 2 independent samples according to the participants' income level*

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<b>Questions</b>	<b>Value of the test</b>	<b>p-value*</b>
To what degree do you believe that working conditions may be harmful for your health and overall welfare?	76,904	<b>0,000</b>
To what degree do you think that the company you are working for provides with the necessary equipment to guarantee your safety?	44,877	<b>0,000</b>
At what degree would you be willing to use new technology / innovative equipment to maximize your health and safety during work?	8,627	<b>0,013</b>

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Please choose the most appropriate answer related to your personal opinion concerning such an innovative product's weight.	10,685	<b>0,005</b>
Given that the company you work for keeps a "smart" database linked to such an innovative gear, to what degree do you find it important that such an equipment could send the database information on physical characteristics during work, like body temperature or heart beat?	6,014	<b>0,049</b>
Is it important to you if such an equipment could immediately notify an official database (that the company you work for keeps) when specific physical characteristics show signs of discomfort and potential loss of consciousness?	13,109	<b>0,001</b>
To what degree would you personally be willing to buy such an equipment?	31,734	<b>0,000</b>

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\*If p-value is lower than 0.05, then the null hypothesis of the test is rejected, meaning that participants from different sample perform statistically significant differences in their opinions.

**Table 6**

*Outcomes of the t-test for 2 independent samples according to the participants' working experience*

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<b>Questions</b>	<b>Value of the test</b>	<b>p-value*</b>
To what degree do you believe that working conditions may be harmful for your health and overall welfare?	72,761	<b>0,000</b>
To what degree do you think that the company you are working for provides with the necessary equipment to guarantee your safety?	44,443	<b>0,000</b>
At what degree would you be willing to use new technology / innovative equipment to maximize your health and safety during work?	11,345	<b>0,003</b>

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Please choose the most appropriate answer related to your personal opinion concerning such an innovative product's weight.	23,036	<b>0,000</b>
Given that the company you work for keeps a "smart" database linked to such an innovative gear, to what degree do you find it important that such an equipment could send the database information on physical characteristics during work, like body temperature or heart beat?	12,733	<b>0,002</b>
Is it important to you if such an equipment could immediately notify an official database (that the company you work for keeps) when specific physical characteristics show signs of discomfort and potential loss of consciousness?	23,315	<b>0,001</b>
To what degree would you personally be willing to buy such an equipment?	45,662	<b>0,000</b>

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\*If p-value is lower than 0.05, then the null hypothesis of the test is rejected, meaning that participants from different sample perform statistically significant differences in their opinions.

**Table 7**

*Outcomes of the chi-square test between the price levels the workers are willing to pay for the safety gear and the demographic features*

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<b>Demographic feature</b>	<b>Value of the test</b>	<b>p-value</b>
Gender	33,333	<b>0,000</b>
Age group	77,778	<b>0,000</b>
Educational state	33,333	<b>0,000</b>
Family state	288,889	<b>0,000</b>
Income level	228,571	<b>0,000</b>
Years of working experience	97,778	<b>0,000</b>

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\*If p-value is lower than 0.05, then the null hypothesis of the test is rejected, meaning that the demographic feature significantly affects the participants' response about the price.

