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INVESTMENT IN TRAINING MATERIAL TO INCREASE TECH-  
NOLOGY DIFFUSION

Master of Science Thesis

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Council of the Faculty of Business  
and Built Environment on 7 August  
2017

## **ABSTRACT**

**ANA OLIVEIRA DE MENEZES MONTENEGRO RAMOS:** Investment in training material to increase technology diffusion

Tampere University of Technology

Master of Science Thesis, 92 pages

June 2017

Master's Degree Programme in Industrial Engineering and Management

Major: International Sales and Sourcing

Examiner: Professor Petri Suomala and Dr. Jouni Lyly-Yrjänäinen

**Keywords:** Technology diffusion, market penetration, customer value, training material

Companies constantly struggle to find solutions that satisfy the needs of the customers in the market. When they do so, the diffusion of the new product or service may ascend naturally among the population. However, for a product or service to be successful, customers must perceive the value of that product or service and its advantages. Thus, it is important to create a product or service that creates value for customers, but also to be able to communicate it effectively, hence increasing its diffusion among the population.

The objective of this study is to discuss investment in appropriate training material to enhance the technology diffusion among the population. When selling a new product, customers are not aware of its functionalities and thus, training material as a tool to help the customers is needed. Developing the training material previously to the sales of the product brings advantages to the company. In other words, the company is using the training material not only to clarify the functionalities of the product to the customers, but also as a way to attract customers.

The key outcome of this study is the creation of a framework based on literature review that represents the increase in technology diffusion when investing in appropriate training material. Further, the ideas of product life cycle and customer value are introduced as a way to understand the intensification in technology diffusion when investment in training material is already done in the introduction phase of product life cycle. In addition, in the beginning of the life of a product, the training material should be more customized according to customer characteristics. On the other hand, the more on the right in the product life cycle curve, the more productized the training material should be.

## **PREFACE**

This thesis describes the importance of investment in training material for technology diffusion. The training material helps customers to understand the functionalities of a new product and its value, but it also can be used to attract customers. The research was conducted by choosing a case from a Finnish Health Care Company.

I am especially thankful to Dr. Jouni Lyly-Yrjänäinen for his endless support and guidance throughout this study. I am also gratified for the support of my parents, family and friends who facilitate this achievement in life.

Tampere, 7.6.2017

Ana Oliveira de Menezes Montenegro Ramos

## CONTENTS

1.	INTRODUCTION .....	1
1.1	Background .....	1
1.2	Objective of the Study .....	2
1.3	Data Gathering Methods and Research Process.....	3
2.	TECHNOLOGY DIFFUSION .....	6
2.1	Market Acceptance .....	6
2.2	Measuring market acceptance .....	6
2.3	Market Penetration .....	9
2.4	Facilitating Market Penetration .....	13
3.	CUSTOMER VALUE.....	19
3.1	Total Customer Value .....	19
3.2	Perceived Customer Value.....	22
3.3	Customer Value in B2B .....	26
3.4	Value proposition for communicating value.....	27
4.	TRAINING MATERIAL .....	30
4.1	Training.....	30
4.2	Training material .....	33
4.3	Benefits of investing in appropriate training material .....	37
4.4	Training material as a tool for technology diffusion .....	40
5.	THE CASE COMPANY .....	45
5.1	The Case Company.....	45
5.2	Service provision .....	48
5.3	Service delivery .....	50
5.4	Benefits of the medicine dispenser .....	52
6.	TRAINING MATERIAL OF THE CASE COMPANY .....	56
6.1	Current training material.....	56
6.2	Current training sessions .....	62
6.3	Issues related to the current training material .....	64
6.4	Issues related to the current training sessions .....	65
7.	PROPOSED TRAINING MATERIAL.....	67
7.1	Developing the training material – Step 1 .....	67
7.2	Developing the training material – Step 2 .....	69
7.3	Developing the training material – Step 3 .....	71
7.4	Road Map for the Investment in Training Material.....	73
8.	DISCUSSION AND LESSONS LEARNED .....	75
8.1	Overview of the Problem and Framework.....	75
8.2	Reflection of the Case in Framework .....	76
8.3	Analysis of the Case Based on Framework.....	78
8.4	Analysis of the results.....	80
9.	CONCLUSIONS.....	83

REFERENCES ..... 85

# 1. INTRODUCTION

## 1.1 Background

Due to the increase in population amount, the number of customers in the market place with different needs has enlarged drastically among the years (Warburg, 2017). Therefore, companies have more opportunities to make profit by developing new products and services that satisfy the various needs of customers. On the other hand, together with the increase in population, also the competition augmented over the years. Thus, to be profitable and stay competitive, companies must invest in products or services which bring high value to the customers.

As soon as companies start having knowledge and aptitude to measure and deliver value to the customers, the higher the probability of success of their offers (Levitt, 1983). Thus, even though it might difficult to quantify the value of an offer, the concept of value is essential in business and deserves great attention from companies (Farrand, 2015).

It is as well crucial to understand market acceptance and how to measure it. Since customer needs constantly change, one must be able to perceive the moment to develop a new product that will substitute an existing one. (Naveed, 2015).

Afterwards, when companies ensure value on their offers and understand market acceptance, it is time to communicate the value. Communicating the value properly is fundamental, so that companies achieve the desired position in the customer's mind (Frederiksen, 2017).

Moreover, according to Fiske (2011), the way companies communicate the value also influences the diffusion of a technology in the market. In other words, if the customers do not understand the value of a new offer, the diffusion of the product or service will be quite limited. On the other hand, when able to communicate the value properly, the diffusion will happen rapidly.

Usually, companies resort to traditional advertising to ensure customers perceive the value of their offers sometimes even before the launch of the products or services. However, traditional advertising as a tool for boosting technology diffusion might require a great amount of investment. (O'Coonor et al., 2007)

When developing or launching a new complex product or service, companies must ensure the existing customers understand the functionalities of that complex product or service. For that purpose, there must be training sessions, customer service and other training

material available targeted to users. Thus, as observable, investment in training material is essential for existing customers to understand the features and functionalities of the new complex product or service. Clearly, the greater the investment in training material, the higher the satisfaction of the existing customer – since in this way he or she can fully understand the features of the product. Finally, higher satisfaction of existing customer will lead to faster technology diffusion. (Maximizer, 2015)

On the other hand, the available training material may also capture the attention of potential customers. In other words, investment in appropriate training material which is available to everyone, may counter-argument wrong pre-assumptions of the customer, who is sceptical about the product or service. When being able to understand the value of the offer through the training material, the likelihood to buy the product will be higher, and hence technology diffusion among potential customers increases. (Maximizer, 2015)

Concluding, training material can also be used as a method to advertise the product or service. Doing so, companies are investing in something with two purposes: one, retaining existing customers and two, attracting potential customers. Consequently, technology diffusion might be faster and more extensive than when resorting solely to advertising.

## 1.2 Objective of the Study

The final goal of a business is to create and develop solutions that can add value to the customers and, hence, permit the company to make profit for the shareholders. When developing new and complex technologies, customers might be reluctant to buy it, and hence, market penetration might be challenging. To increase the market penetration of a new technology and consequently its diffusion, customers must be able to perceive the value of the offers. In addition, training material is usually understood as a very efficient method to instruct employees. The objective of this study is...

*... to discuss the investment in training material to increase the diffusion of a technology among the population.*

This thesis aims to develop a theoretical framework that demonstrates the increase in the speed of technology diffusion and in the increase of sales, when appropriate training material is developed for potential and existing clients, rather than for the employees of the company. Further, this thesis proposes the idea of developing training material for a health care device targeted to the clients of the company offering this solution. It is observed that the targeted customers are quite reluctant to purchase the equipment, due to lack in perceiving its value or due to apprehension with the new technology. In addition, the existing training material for customers is scarce and simple, not including information regarding several potentials and features of the machine. Due to the lack of information regarding the machine functions, customers cannot realize the value of the offer and thus, the diffusion of the technology is increasing at a very low-path. The proposed training

material must counter-argument the wrong pre-assumptions of the targeted clients, even before they arise.

The structure of this thesis is as follows. The second chapter comprehends the idea of technology diffusion, with reference to the penetration of a new technology. The third chapter illustrates the concept of customer value and how it can be used as a tool for penetration of a new technology. The fourth chapter presents the theoretical framework for technology diffusion through investment in appropriate training material.

The fifth chapter presents the case company and chapter six their current training material. The chapter seven presents the proposed training material for the company. Further, chapter eight shows the overview of the problem and implements theoretical framework for increasing the diffusion of their health are revolutionary technology. Finally, the last chapter presents the conclusions.

### **1.3 Data Gathering Methods and Research Process**

Research is a fundamental step to gain knowledge about a specific topic both in business and academic activities. Amaratunga et al. (2002) discusses research as a systemic and methodical process of investigation. Kasi (2009) states that research is a method for investigating and gathering information to discover or review new evidences, theories and applications. Therefore, research can be defined as a systemic and methodical process to investigate and gather information with the final goal of discovering or reviewing new facts, theories and applications.

In case studies, both qualitative and quantitative data generation methods can be used. However, systematic studies by collecting qualitative data is the most common way of doing research. According to Gummesson (1993) there are several methods for generating qualitative data:

- Using existing material
- Questionnaire surveys
- Qualitative interviews
- Observation
- Action science

First, existing material includes for instance books, research reports, articles, archival records, mass media reports, computer data bases, photos and notes. This method is called secondary data since it was created for somebody else's purpose. Thus, possible problems in the industry that were already identified and documented are considered existing material as well since they are considered experiences of others. Second, questionnaire surveys are tools for supporting, formalizing and standardizing interviews. They are associated to quantitative methods, but can be used also in qualitative research and case studies.

Third, qualitative interviews are the most usual way of gathering data in case research. Furthermore, they are more similar to a conversation in comparison to a formal interview. Fourth, observation requires the use of all the five senses to gather the necessary data. This method can be divided into participant observation and direct observation. The first one requires the presence and personal involvement of the researcher. On the other hand, in the latter approach, the researcher is not taking part of the work he or she is observing, but only watching the process. Finally, action science, requires active participation in the study; the researcher is now an active participant that influences the process being studied. According to Suomala and Lyly-Yrjänäinen (2012), interventionist research forms a cluster of research approaches, in which action science is included. Interventionist research assumes that the researcher is a facilitator of change; the researcher is actually trying to influence the organization, thus called as an active-intervening-participant, and not only an active-participant. Furthermore, rather than studying, the interventions managers do; the active-intervening-participant is intervening by facilitating some change process to create theoretical contribution.

This thesis started with the study of a Finnish company providing healthcare solutions to home care organizations. The empirical research process started in January, 2017 with the analysis of the technology offered by the company.



**Figure 1. The Research Process.**

The objective of this thesis was the creation of a theoretical framework that commits organizations offering new technologies to invest in training material to increase technology diffusion. The framework then was applied in the referred Finish company. To complete this thesis, existing materials, observations, qualitative interviews and action science were used.

In this thesis, besides using existing material (*etic* level), the author actually penetrated into the *emic* level. According to Suomala and Lyly-Yrjänäinen (2012), this happens once one actually reaches the “inside”. The author was able to use its own study as an “insider” in order to contribute for the company. The research helped to clarify some ideas and gave new perspectives about the current work in the company.

Through the analysis of the company's sales and technology adoption from customers, some problems were identified in the current communication of value. For that purpose, the training material for home care organizations and other crucial information was studied through the use of existing materials, qualitative interviews with the personnel of the company and observation. Therefore, the training material showed to be very simplistic, explaining the reluctance of the customers to purchase the technology. Through the presented framework, the author was able to influence the Finnish healthcare company, explaining the use of interventionist research.

## **2. TECHNOLOGY DIFFUSION**

### **2.1 Market Acceptance**

According to Warburg (2017), world's population has been increasing over the years. Consequently, the number of customers in the market place with different needs has enlarged drastically. Along with this fact, companies constantly seek to develop a solution which will match the customers' needs and allow profit for the owners.

Market acceptance is defined as the degree of fulfilment with a good or service in a target market that demands continuous or more supply of that good or service (Doyle, 2016). Geroski (2000), also defines market acceptance as the decision of the market to accept and therefore adopt an innovation. When companies are able to create a product or service which is accepted by the market, the probability of the company's success increases drastically. For that purpose, technology diffusion plays an important role. When an innovation is communicated within the members of a society over the time through diverse channels, it is called diffusion (Rogers, 1962). Technology diffusion, then, is a concept used to define the process by which technologies are accepted or adopted by the population (Keller, 2004).

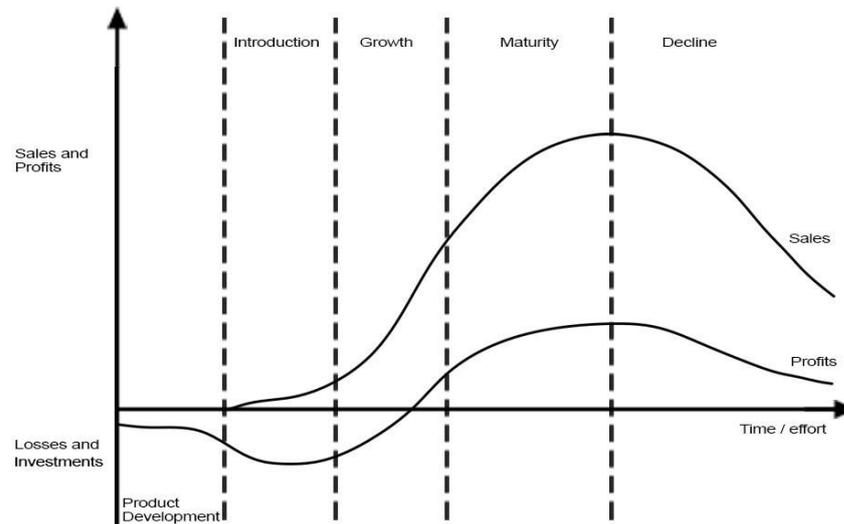
According to Murad & Thomson (2011), when not able to hold the technology diffusion and thus, not able to adjust to the speed and instability generated by technology change, a company does not have competitive advantage. Therefore, in order to be successful among competitors, it is fundamental that the technology diffuses. The rate of its adoption depends on many factors, such as the quality of the innovation, its communication and the characteristics of the market.

First, higher the quality of the product or service, higher the probability of its diffusion and the rate of diffusion. Second, better communication leads to better understanding about the product and service; on the other hand, more communication leads to more visibility. Thus, technology tends to diffuse faster. Finally, the characteristic of the market also influences how the technology is adopted.

### **2.2 Measuring market acceptance**

As previously mentioned, market acceptance is an important concept that influences the success of an organization. Therefore, to understand their position on the market, companies must have an insight regarding market acceptance of its products or services. In other words, companies should be able to measure the acceptance of their offers.

To measure market acceptance, companies can resort to some management tools, such as the product life cycle curve, the technology adoption curve and market penetration. First, product life cycle curve shows the distinct phases of the products over time, taking into consideration its annual sales volume and profits (Black et al., 2017). Figure 2 illustrates the product life cycle curve.



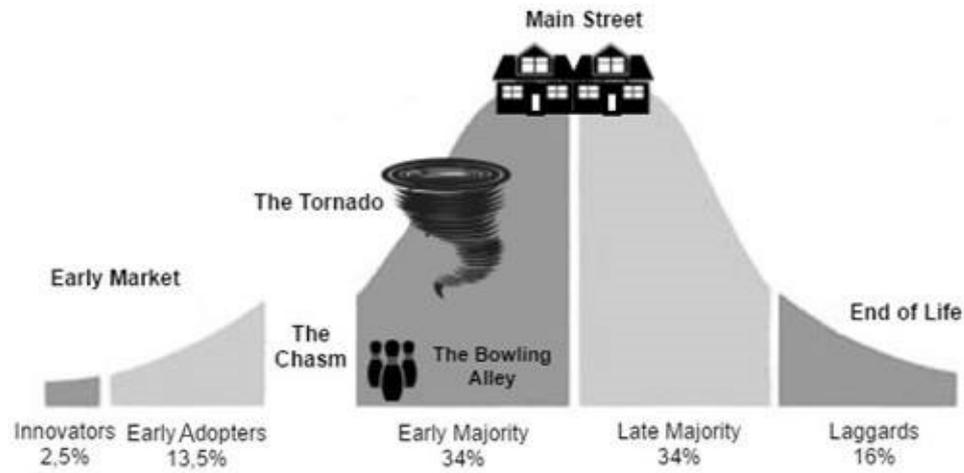
**Figure 2. Product Life Cycle (modified from Law, 2016).**

As seen from the figure above, the product life cycle comprises five phases, such as product development, introduction, growth, maturity and decline. First, during the product development phase, investments are made in order to translate the idea into a prototype and to develop the marketing strategy. Second, in the introduction phase, the sales are low and investments are needed - explaining the negative profit - since there is not yet vast knowledge regarding the product. Through the feedback of the customers, the product starts to be adopted. Thus, diffusion is a large responsible for the increase in sales. In addition, sales can increase by marketing campaigns and great initial offers. As the purchasers show satisfaction with the product, and its diffusion increases, the growth phase approaches. Thus, third, growth phase is characterized by increase in sales and more product availability. In this phase, the investment pays itself back. Fourth, in maturity phase, supply and demand are matched due to arising of competitors' products. This phase is the longest one and it is characterized by harsh competition. Thus, companies try to reduce costs of production so that profits can be increased. Finally, the decline stage will nevertheless occur. A new and better product that satisfies the needs of customers will emerge and at some point, the product must leave the market. Once the profit starts decreasing drastically, a company must understand that is moment to abandon the production of the product. (Law, 2016)

Even though product lifecycle shows an overall trajectory of the sales and profits of the products over the time, each product differs from each other, and some products might even not survive beyond the introduction phase (Law, 2016). Still, product life cycle to

understand market acceptance plays a fundamental role in technology strategy of the company.

As mentioned above, the rate and rapidity of acceptance differs from product to product. On the other hand, it also depends on the distinct types of consumer. The consumers are divided into distinct categories, according to their propensity to innovate and try new products. The different adopter categories are innovators, early adopters, early majority and laggards. Figure 3 shows the technology adoption curve. (Doyle, 2016)



**Figure 3. The Technology Adoption Curve (modified from Moore, 1995).**

First, only 2.5% of the market is a risk-taking class. The innovators are characterized by their desire and passion for new ideas and products. Thus, they appreciate to be the first to acquire the innovations rather than being a follower. (Doyle, 2016)

Second, early adopters represent 13.5% of the market and are characterized for buying the good or service in the initial phase of its life cycle. The early adopters are considered more conscious than the innovators but still represent a small portion of the market. The referred group is likely to influence a large segment of the market to buy the product – early and late majority.

Third, early majority represents a large percentage of the market, characterized by their consciousness for innovations. They are not considered leaders but still influence others to buy. In addition, they tend to evaluate the different alternative and competitive solutions and gather information in order to make the decision to buy, making the process of adoption quite slow. (Doyle, 2016)

Fourth, late majority represents a large percentage of the market as well, and usually accept the products or services only after the early majority. This group is highly influenceable by the environment around and usually expect the prices to come down in order to buy the innovations.

Finally, only 16% of the market are considered laggards, the last class adopting the goods or services. They are not influenceable by the society but rather by tradition and past. They are apprehensive about the future and new ideas, thus at the moment of purchase, the product or service might not be considered an innovation anymore. (Doyle, 2016)

In addition, Figure 3 emphasizes six different zones. According to Moore (1995), the zones are as following:

- Early Market
- The Chasm
- The Bowling Alley
- The Tornado
- Main Street
- End of Life

First, early market is defined as the moment of great enthusiasm when innovators and early adopters seek for being the firsts buying the products or services. Second, the chasm, a period of distress in which the mainstream market is not yet convinced or willing to adopt the innovation. Usually in this period, after the great despair of the early market, the sales drop drastically. Therefore, in order to “cross the chasm”, companies must show the value of the product to the customers, develop a complete solution to customers’ problems and follow a vertical marketing strategy rather than a horizontal marketing strategy. In case the products can “cross the chasm”, they will be adopted by the early and late majority.

Third, the bowling alley is a time of niche-market adoption before the general marketplace. Fourth, the tornado is a moment of mass-market adoption in which the marketplace swaps to the infrastructure pattern. Fifth, main street includes the time of aftermarket growth in which the infrastructure has been implemented and the main objective is to expand its potentiality. Finally, in the end of life it is possible to find the laggards, in which, as previously referred, an innovation might not be considered an innovation anymore. (Moore, 1995)

Lastly, market penetration is also a measure for market acceptance. In other words, market penetration is a measure of how much a product is adopted in a potential market. According to Law (2016), market penetration can be defined as “the process of entering a market to establish a new brand or product”. Therefore, higher percentage of adopters implies higher market acceptance.

## **2.3 Market Penetration**

As previously mentioned, Law (2016) defines market penetration as the method of entering a market to implement a new brand or product. In addition, he also relates the term

market penetration with market acceptance, meaning that a high market penetration is related to the percentage of adopters of that product or brand. Clearly, if there are small number of adopters of a particular product, the market did not really accept the product and hence, it cannot be considered that the product penetrated the market. In addition, the level of a good's market penetration is an indicator of the saturation of the market for that type of product.

To penetrate the market successfully, companies must recourse to a detailed analysis of the market. As well, the increased fierce competition enhances the importance of this analysis (Cavusgil, 1985). According to Dibb & Simkin (1996), this analysis comprises various decisions on market penetration strategies, such as:

- Identify the needs and goals of the selected market
- Decision on the target market
- Marketing Mix
- Differentiation
- Brand or Product positioning

First, when trying to penetrate a market, it is fundamental to take into consideration the needs of the market. In other words, companies must try to create smaller homogeneous groups, since very rarely companies can offer a product that fills the needs of all customers. (Ferrell & Hartline, 2014)

The different target segments, can be originated from geographic segmentation, demographic segmentation, psychographic segmentation and behavioral segmentation. Geographic segmentation is done when dividing the market in different geographical areas. Then, demographic segmentation refers to division of the market according to demographic variables, such as age, gender, education and religion. Psychographic segmentation is based on the lifestyle or character. In other words, the market is segmented into smaller groups such as conservatives, traditionalists and liberals. Lastly, behavioral segmentation groups people with similar attitudes towards a product. (McDonald & Dunbar, 2012)

The previous target segmentation was based on business-to-consumers (B2C) markets. According to Thomas (2016), in business-to-business (B2B), there are other ways to segment the market, such as geographically, according to the customer size, buying behavior, customer competences and application. Firstly, geographic segmentation, as in B2C refers to division of the segments according to different geographical areas. Secondly, customer size segmentation, as the name suggests refers to create segments according to the dimension of the customers. Thirdly, segmentation based on buying behavior means dividing the market in groups of potential customers with similar buying process. Fourthly,

customer competences segmentation refers to division of the market according to the expertise of the potential customers. Finally, segmentation based on the application of the product. In other words, in which industries could the product be targeted for.

Second, companies must be able to identify the market they intend to penetrate with their product according to their capabilities and with what they can offer. For instance, whether the market include consumers (business-to-consumers) or business (business-to-business) or both. As mentioned, any product or even business can be directed to every individual, thus, the more narrowly the market is defined, the more is the probability of finding common needs and therefore satisfy them with the offer. This way, customers will be pleased to purchase the product, increasing its market acceptance and hence the market penetration (Entrepreneur Staff, 2013)

According to Johansson (2009), there are two means to penetrate the market. Firstly, define various markets and understand the reasons to penetrate each of them. When a market appears to be attractive, estimate if the company has enough resources to penetrate it. Secondly, gathering information about the market size, growth, entry barriers and competitiveness of the market share.

Third, marketing mix is a management tool to design an appropriate product offer. It consists of 5P's: product, pricing, place, promotion and people. This means that each target market segment requires study regarding the product to offer, such as product variety, quality, brand name and design, regarding price strategies, distribution channels and locations and regarding sales promotion and advertising and people. People includes the individuals worried about delivering aspects of the service or product. (Dibb & Simkin, 1996)

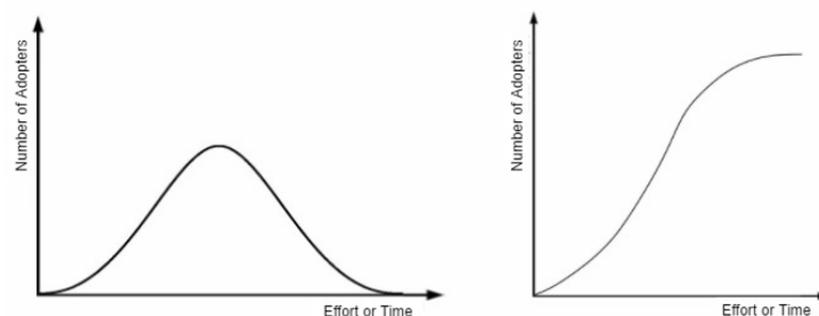
To penetrate the market effectively, companies may play with the 5P's. Such tactics to increase market penetration and hence the sales, are for instance improving quality of the product, price reduction, expanding distribution channels, increasing promotion, creating barriers to enter and strategic alliances. First, obviously improved quality in products or services leads to more satisfied customers. Satisfied customers then, will diffuse the product or service to their relatives and friends, who will also desire that product or service. Second, by reducing the prices of current products or services, sales often increase. However, it is important to bear in mind that reducing the prices is much easier than increasing the price. In other words, when it is time to increase the price of the product, customers may complain and stop buying the product. In addition, it is fundamental to not disrupt the brand image of the company by reducing often the prices, since customers may start wonder that the products or services of the company are of sub-standard quality. For solving the above-mentioned issue, companies may decide for price campaigns, in which the price will drop temporarily, but have a fixed date for its increase in price. This way, customers who never thought about buying the product or service due to the price, have now the opportunity to do so. Afterwards, they may highly appreciate it, and thus, decide

to purchase the product or service more often even though it is more expensive. Third, expanding distribution channels will increase the visibility of the product. This way, potential customers who did not know the product or service, have now the opportunity to purchase it. Fourth, increasing promotion includes for instance advertising the products or services. By investing in advertising, companies may get the attention of current and potential customers, and get some from the competitors. If the marketing is well thought, the company is able to increase the sales and hence, the investment is worth it. Fifth, barriers to entry are obstacles that avoid the entrance of new competitors in the business. By creating them, companies protect their revenues from going to another competitor. One way to create barriers to entry is to minimize the variable costs; it leads to increase in sales and higher profit margins per sold item. This way, potential competitors do not dare to enter the industry. Finally, when difficult to enter the market, companies may decide for strategic alliances. Companies get more power and more possibilities to make investments. Profits must be divided, but sales of the products and services may increase drastically. (Shethna, 2016)

Fourth, companies must be able to offer product or services different from competitors. Dibb & Simkin (1996), define differentiation as a “unique product or marketing offer”.

Finally, the last decision on market penetration is how the company wants to position itself in the mind of the customer. An appropriate brand positioning allows the customers to understand the benefits of the offer. (Dibb & Simkin, 1996)

Therefore, when being able to follow the mentioned marketing strategies, a company is more likely to penetrate the market effectively. Clearly, the tactics mentioned above increase the market penetration, which is translated in increase in sales of the existing products and services and diffusion of the same products and services. Typically, as previously presented, the diffusion of an innovation follows a normal distribution; its cumulative function represents the market penetration of an innovation. Therefore, the market penetration follows an S-shaped curve. Figure 4 emphasizes the diffusion curve of an innovation (left side) and introduces the market penetration curve based on the number of adopters.



**Figure 4. Normal distribution and cumulative distribution function (modified from Devaraj & Kohli, 2017).**

Figure above shows the cumulative curve of the technology adoption curve (right side of the figure). As observed, the more the time and effort invested in the product or service, the more people will adopt it. In the beginning, efforts and resources are spent in order to diffuse the product, but few actually adopt it. Together with the growth and maturity of a product, the diffusion increases and hence, more adopters of the product or service emerge. At this time, the market penetration is also higher. In addition, the decline stage in the product life cycle will nevertheless occur due to the entrance of a new product. In the decline phase of a product life cycle, only the laggards purchase the innovation. As observed, the market penetration is faster when the early and late majority adopt the product. Despite the presented figure regarding market penetration curve, it is important to note that the S-curve solely represents successful innovations. In other words, for some innovations the diffusion never takes off (Rogers, 2003).

## 2.4 Facilitating Market Penetration

As previously referred, market penetration is a measure of market acceptance for a particular product (Law, 2016). On the other hand, penetration of a new technology is defined as the rate of adoption of a technology in the everyday life of a population (Hall & Khan, 2003).

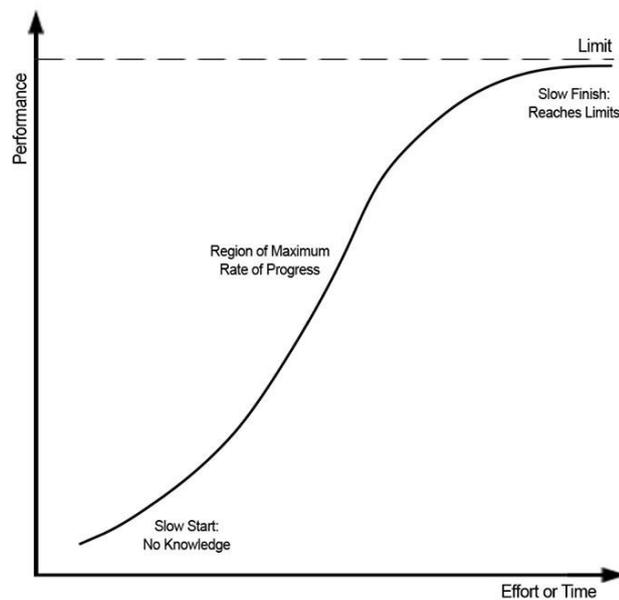
According to Blomstrom & Kokko (1998), technology is an abstract concept making it quite difficult to understand, observe and assess. Due to the difficulty in defining the concept, many authors express different opinions on the matter (Reddy & Zhao, 1990). In addition, Lan & Young (1996), emphasize that the definition of technology varies according to different authors and context.

Merrill (1968) discussed for the first time the concept of technology as the application of “practical arts, bodies of skills, knowledge and procedures for making, using, and doing useful things”. Further, Sahal (1981) defined technology as “configuration”, realizing that the object (technology) depends on a subjectively established, still specifiable group of processes and products. Kumar et. al (1999) defend that technology is constituted by two main components. First, a tangible element, such as products, equipment, blueprints, practices and processes. Second, the informational element, such as the know-how in management, marketing, manufacturing, quality control, skills and functional areas. In accordance to the last definition, there are then two main elements of technology, knowledge or methods used and “doing things” (Wahab, 2012). Lastly, Reisman (2006) defined technology as the creation and implementation of utensils, equipment, materials and processes that assist human needs or problems.

According to Geroski (2000), the market penetration of a new technology over time naturally obeys an S-curve. There are various models that explain the previous affirmation, but the main two are: epidemic model and probit model. First, epidemic model is the most

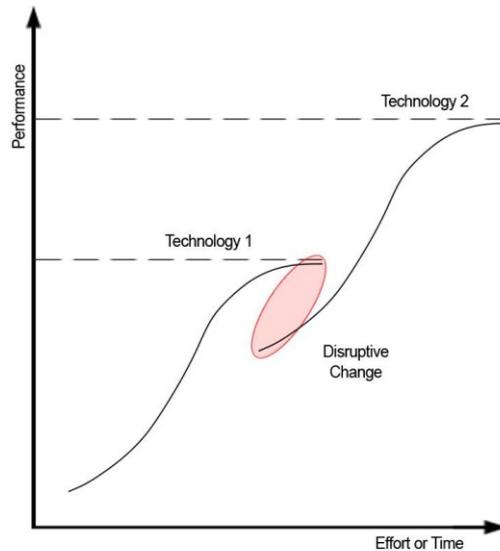
common model and defends that the absence of existing and accessible information regarding the technology (how it works) limits the speed of its usage. Therefore, the more information available regarding the technology, the faster the diffusion. The later model, indicates that the adoption of the technology from distinct companies can occur at different times, depending on their goals and skills.

The technological innovation can be developed in two ways, such as incremental innovation and radical innovation. White et al. (2007) explains the incremental or continuous technology as an innovation in technology that occurs over small periods of time is usually incremental. Figure 5 shows incremental technology.



**Figure 5. Technology S-curve (modified from Foster, 1986).**

As seen in the figure above, a technology starts slowly due to lack of knowledge and then, the more effort or time, the higher the performance. Nevertheless, the technology will reach its limit. Due to the rapidity of change, companies should not depend solely on incremental innovation, they should arise with new and fresh ideas, which can substitute the existent products, services, processes and concepts. For long term success in such a competitive market, companies must resort to radical innovation, also called disruptive technology (Foster, 1986). Figure 6 presents the radical technology.



**Figure 6. Radical Innovation (modified from Foster, 1986).**

As observed from the figure above, a new technology will always substitute an older one, whether technologies developed from competitors or from the same company. Therefore, according to Foster (1986), to survive in a competitive business, it is crucial to take into consideration the technology s-curve and start developing a new technology already in the region of maximum rate of progress of the existing technology rather than close to its limit. In other words, companies may take advantage as a first-mover and penetrate easily the market with the new technology. Evaluating the megatrends and investing in research and development plays a crucial role in order to develop the appropriate new technology, and consequently penetrate the market easily.

Penetrating the market with a new technology might be quite challenge and slow if the price/ performance is unappealing and if it demands adoption of many diverse individuals. Moreover, the adoption of a new technology might be costly, for different reasons identifies below. (Shapiro & Varian, 1999)

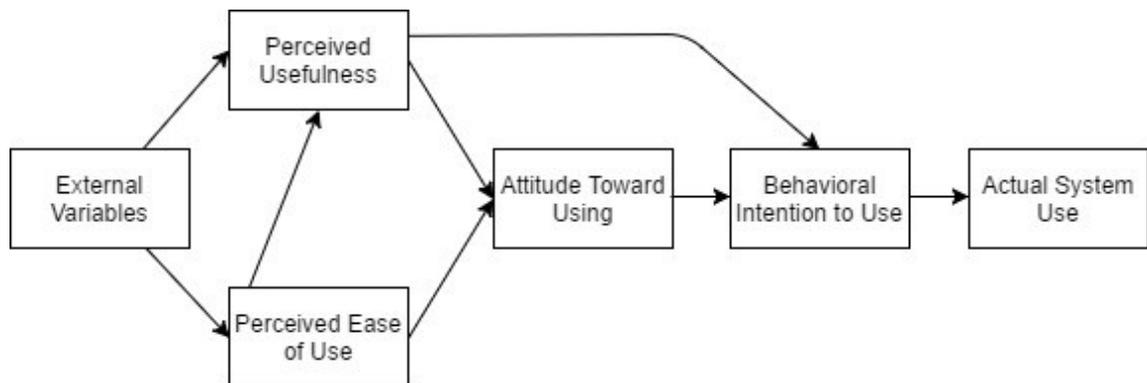
- New machines have to be purchased, which usually are specific assets
- Cost with job training, so that employees learn how to work with the new technology
- Complementary machines may have to be updated or substituted, in case of network effects
- To install the new machine, some operations may need to be shut down, hence there will be costs related to loss of output

Since there might be many costs involved related to penetration of a new technology, companies must have a clear idea of which will be the investment and how the investment can be paid off. To pay off the investment, and get profit how of the technology, it is

crucial to get the attention of the customers and communicate the value of the offers effectively. The better this is done, the higher the number of adopters and the sales of the technology.

When launching a new technology, the market is not aware of it, and that is why technology diffusion is an important concept related to penetration of a new technology. As cited, every technology will approach a natural limit when another technology that matches better the needs of the customers emerges. However, taking the maximum advantage of an innovation regarding sales and profits during its product life cycle is the main goal of a business.

Davis (1989) developed a model which explains the acceptance of a technology from customer's side, named Technology Acceptance Model (TAM). The model includes two beliefs: perceived usefulness and the perceived ease of use. These two beliefs determine behavior to adopt new technologies. Figure 7 presents the TAM model (Davis et al., 1989).



**Figure 7. Technology Acceptance Model (modified from Davis, 1989).**

Perceived usefulness refers to the believe of the customer that the technology will improve his or her job or life performance. On the other hand, perceived ease of use is the believe that using the technology will be free of effort. These two main beliefs are constantly affected by external variables, such as social, cultural and political factors. Afterwards, attitude toward using depends on the customer's attractiveness of engaging the technology. The probability to buy the technology is then explained by the behavioral intention to use. Lastly, actual system use, as the name suggests, is when the customer adopts the technology. (Surendran, 2012)

The referred model explains the factors which influence the purchase of a technology, which is closely related to market penetration. Nevertheless, each technology in a particular market has an exclusive diffusion shape, explaining the reason why there are so many different S-shape curves.

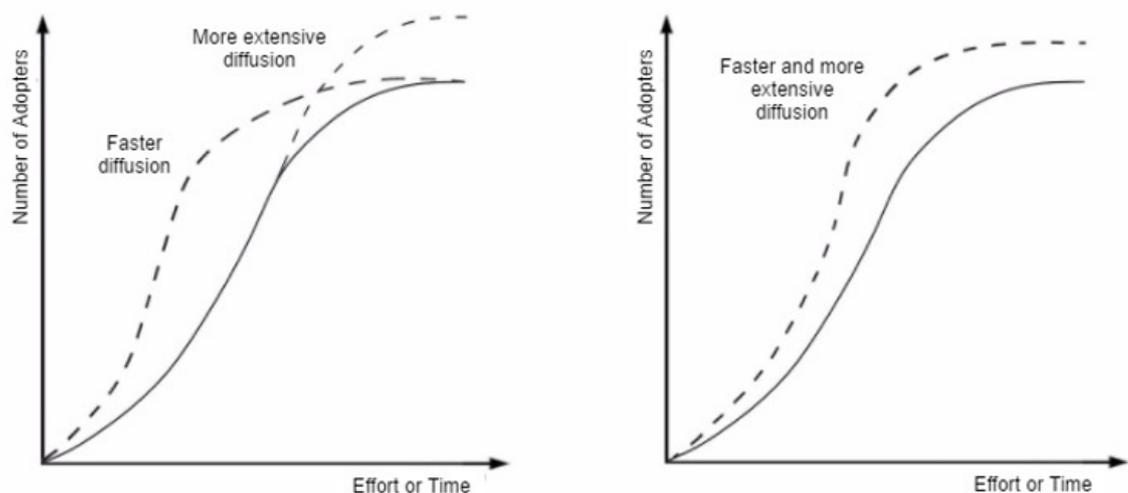
In addition, Rogers (2003) identified other factors that affect the market penetration rate, and therefore the diffusion of the technology. The perceived attributes of innovation are

relative advantage, compatibility, complexity, trialability and reversibility, and observability.

First, relative advantage refers to the superiority of a technology in comparison to the ones of competitors. Second, compatibility compares how compatible the technology is with the values, hopes, needs and practicalities of the potential customers and with other innovations. Third, complexity indicates how hard is to use the technology. Complexity can be seen as perceived ease of use in the model of Davis (1989). Fourth, trialability refers to the possibility the customers have to try the machine previous to its purchase. If they can cancel the purchase, it is called reversibility. Finally, observability studies if the technology is easily observed or communicated.

Technologies with more relative advantage, compatibility, trialability, reversibility and observability and less complexity according to the customers perception, diffuse faster (Rogers, 2003). According to Rogers, the mentioned perceived attributes of innovation are constant. As an example, if a product has a specific complexity, this cannot be changed. In this thesis, it is considered that these attributes can change and be influenced. The focus is on the observability, which can be improved through various means.

At the time of the introduction of a new technology, companies expect fast and extensive diffusion. According to Lund (2006) and taking into consideration the S-curve, faster technology diffusion implies that the take off point is reached earlier and the curve is more pronounced. On the other hand, an extensive S-curve indicates that the saturation level of penetration is higher (higher number of adopters). Welin (2017) presented a framework to explain a faster and more extensive S-curve (Figure 8).



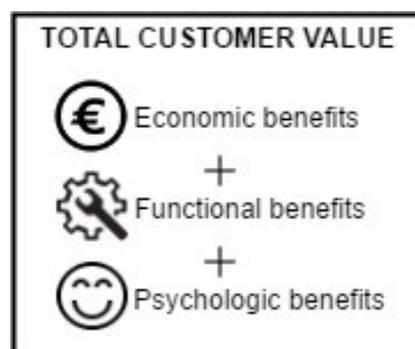
**Figure 8. Faster and more extensive diffusion and their combined result (modified from Welin, 2017).**

Therefore, in order to successfully penetrate in the market with a new technology, companies must find ways to foment fast and extensive diffusion. For that purpose, firms can resort to different management tools and supporting materials.

## 3. CUSTOMER VALUE

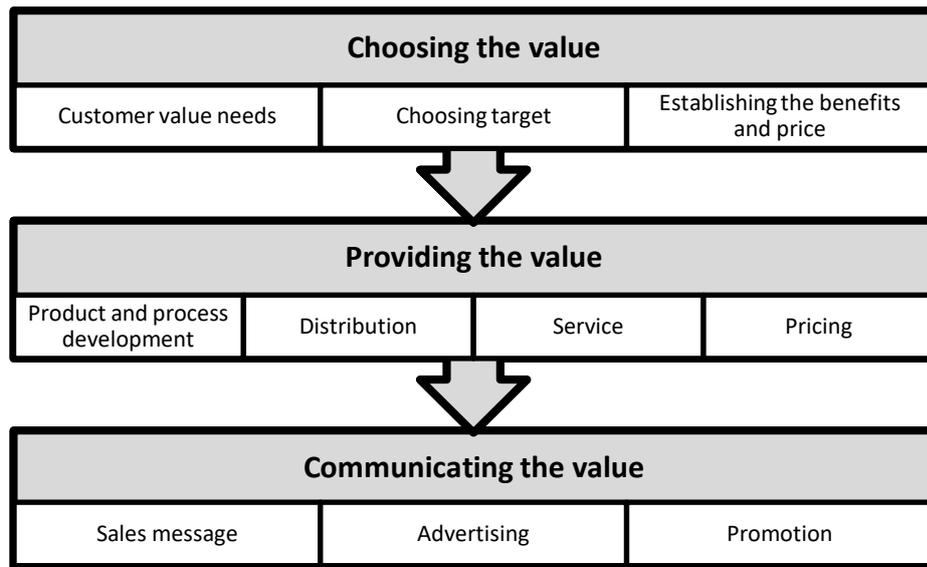
### 3.1 Total Customer Value

Customers, constantly search for products in the marketplace that can provide them functional, economic, and psychologic benefits (Rintamaki et al., 2007). Figure 9 presents the benefits. In addition, customers do not purchase products that do not offer any benefit. First, functional benefits include the functionalities a product offers and its main purposes (Joseph, 2015). In addition, Joseph (2015) defends that most categories offer similar functional benefits. For instance, hair care products offer solutions to style the hair, such as clean, condition, soften, smooth, texturize and straighten. Other than that, there are not many other functional benefits even though there are plenty hair care products in the marketplace. Therefore, to decide which brand to buy, customer focus on the other two benefits. Second, Law (2016) defines economic benefit as the gains expressed in financial terms. Basically, customers search for solutions that allow them to save money in the short-term or long-term. In the example given above, the customers would choose the cheaper hair care product brand or the one that in long-term would bring economic benefits. Finally, psychologic benefits are also of extremely importance. These benefits comprise the feelings a particular product brings to the customer (Friedmann & Lessig, 1986). Using the example of the hair care products, some customers might prefer a brand over other, due to the position the brand occupies in the customer's mind. In other words, customers might be more emotionally attracted by a brand among others. Thus, the different benefits mentioned above are the reasons which lead a customer to buy a product. Total customer value is then the monetary value of these benefits that a product offers. (Anderson & Narus, 1998).



*Figure 9. Total customer value.*

Lanning & Michales (1988) developed a framework for the effective delivery of value, which includes three fundamental stages: choosing the value, providing the value and lastly communicating the value to the customer. Figure 10 shows an adaptation of that framework.



**Figure 10. Value delivering system (modified from Lanning & Michaels, 1988).**

First, choosing the value includes understanding the value needs of the targeted market, in order to define the value proposition. Second, providing the value refers to satisfy the customer and market place through product and process development, distribution, service and pricing of the product. Finally, communicating the value includes the possible sales message, advertising and promotion of the product. (Lanning, 2000)

Plaster & Alderman (2006) presented the concept of value creation as a procedure for creating profitable growth for a firm by creating and distributing the projected value to consumers. In other words, customer value creation is centred on the customer in order to support the growth of the firms. In addition, value creation can be represented by the following formula:

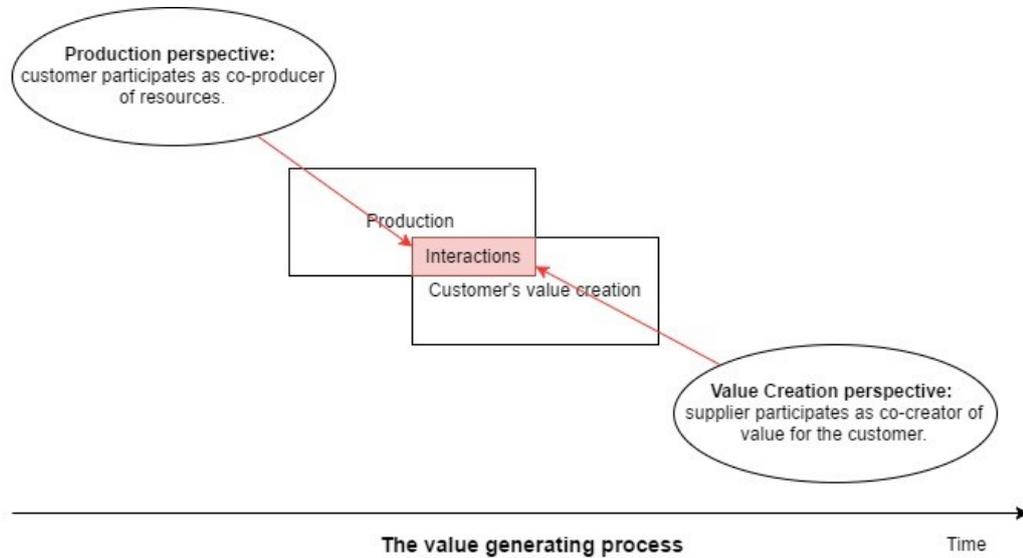
$$\text{Value Creation} = \text{Customer Value Analysis} + \text{Operational Excellence}$$

Customer value analysis can be defined as the skills a company have to realize how value is created and taken by the customers. Basically, what the customers consider valuable for them. Operational excellence refers to the internal processes' quality to deliver the right value to the customers. (Plaster & Alderman, 2006)

Ostewalder & Pigneur (2003) view the value creation as one of the five stages of value cycle. The core responsible for adding value in this phase are marketing and development (Hassan, 2012). Therefore, the core objective is to sustain value creation for the consumer and allow value creation by the supplier called reciprocal value creation (Grönroos & Ravald, 2009).

However, it is fundamental to not confuse production with value creation. On one hand, production includes developing, designing, manufacturing and delivering and therefore,

it is part of the whole process of value generation. In addition, production happens in the supplier's environment. On the contrary, value creation occurs in the customers' value-creating processes, this is, in the customer's environment. Though, as seen in Figure 11, there is an area of contact between production and value creation. (Vandermerwe, 1996)



**Figure 11. Contact between production and Value creation (modified from Grönroos, 2011).**

As observed in the figure above, interactions are seen from two perspectives: production and value creation. First, the production perspective, the customer engages with the supplier as a co-producer. Second, value creation perspective implies that the supplier takes part as a co-creator of value for the customer. To clarify, co-creation can be defined in this framework, as the influence of one party in another for the creation of value.

From the figure and according to the theory, it can be stated that the main function of the supplier in the value creation process is to enable and help the customers' value creation. In addition, the supplier may also contribute for the customer's value creation and then both, become co-creators of value. Furthermore, the more the supplier takes part of the interaction platform, the more the supplier is involved in the value creation for the customer, and hence, more opportunities the supplier has.

Concluding, according to Grönroos (2011), since value creation happens in the customer's domain, the supplier is the one being invited to participate in the customer's usage procedures to assist the value creation for the customer. However, due to the supplier-customer contact, the supplier may influence customer's value creation.

Participation of the supplier in customer's value creation means involvement in different customer's processes, such as purchasing, orders, storage, billing, usage, maintenance and product's or service's advice (Grönroos, 2009)

### 3.2 Perceived Customer Value

Total customer value itself does not reveal much information to the customer. In order to be able to recognize whether the product is worth to buy, the customer must know its cost. Total customer cost includes the expenditures the customer has or will have with the product, such as purchase cost, usage cost and disposal cost (Figure 12). First, purchase cost, as the name suggests, is the price paid at the time of the acquisition of the product. Second, usage cost includes all the expenditures that come from the usage of the product. Examples are insurance and maintenance costs. Finally, disposal cost includes the expenditures involved when discarding the product.



*Figure 12. Total Customer Cost.*

According to Naveed (2015), despite the many existing definitions of perceived customer value, all of them agree that the total customer value of a product must be compared to its total customer cost. In other words, perceived value can be defined as the difference between the total customer value and the total customer cost (Figure 13).

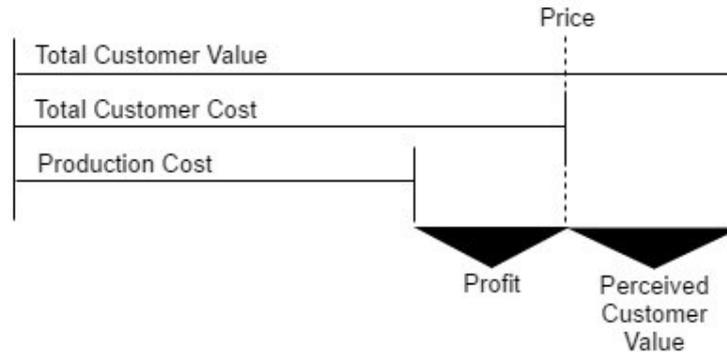


*Figure 13. Perceived Customer Value.*

It is also significant to mention that the perceived customer value should be greater than zero for the customer to buy it. In other words, the total customer cost must be smaller than the total customer value. If the customer does not perceive any value on the offer, there is no sense in purchasing it. (Naveed, 2015)

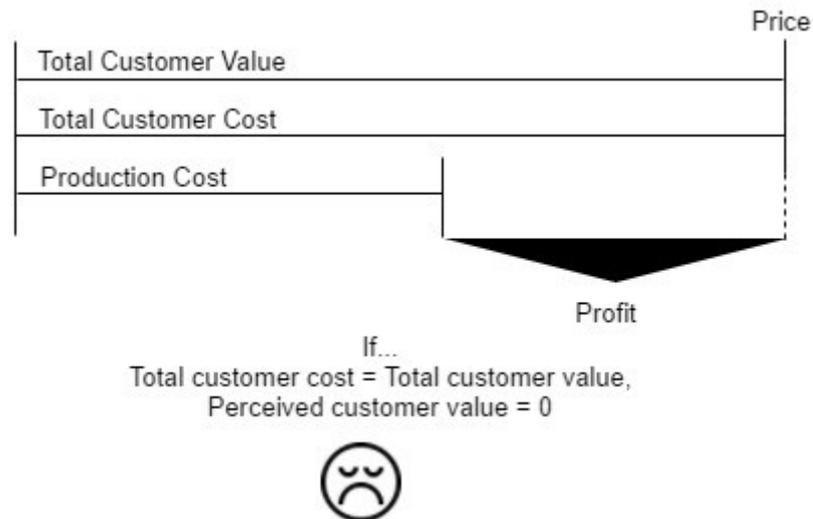
Lyly-Yrjänäinen et al. (2009) presented a framework that illustrates the total customer value and its relationship with perceived customer value and profit (Figure 14). The figure suggests that when pricing a product, a company must take into consideration not only its

profit but also the perceived customer value. Thus, the price or the total customer cost of a product must be smaller than the total customer value, but higher than the production cost, in order to be profitable for the company.



**Figure 14. Perceived Customer Value (modified from Lyly-Yrjänäinen et al., 2009).**

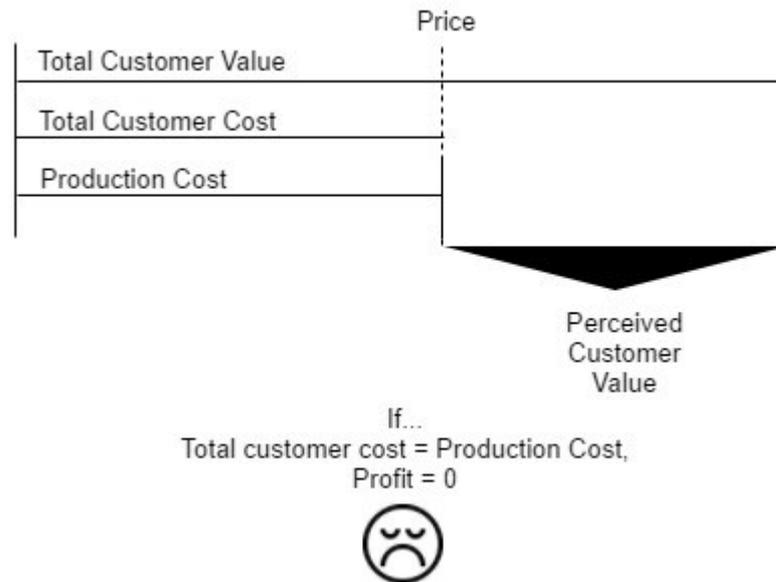
As referred above, perceived customer value should be greater than zero. If that do not happen, the customer will not buy the product. Figure 15 illustrates the situation in which the perceive customer value is equal to zero.



**Figure 15. Situation in which perceived customer value is equal to zero (modified from Lyly-Yrjänäinen et al., 2009).**

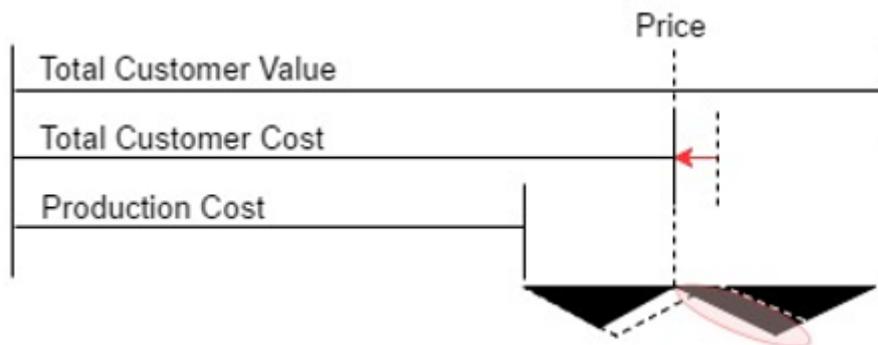
As seen from the figure above, if the total customer equals to the total customer value, the company can make a higher profit. However, if the perceived customer value is equal to zero, the customer does not have any reason to buy it, and hence the product will not sell.

On the other hand, if the price or total customer cost equals the cost of production of the product, the company does not make any profit (Figure 16). Thus, even though the customer is highly satisfied due to the high perceived value, there is no sense for the company in selling it, since it is not making any profit.



**Figure 16. Situation in which total customer cost is equal to production cost (modified from Lyly-Yrjänäinen et al., 2009).**

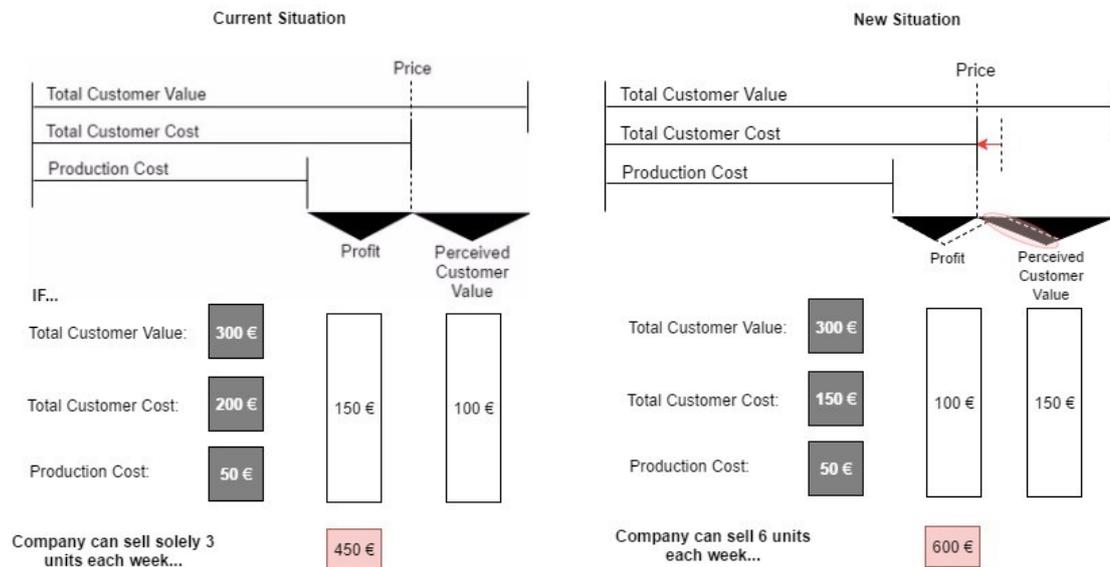
As mentioned, the less the total customer cost, the more the perceived value, and hence, the more satisfaction of the customer with the purchase of the product. Therefore, higher perceived values influence positively the customer purchasing behavior. In other words, the diffusion of the technology happens more rapidly and the number of adopters of the technology increase. Figure 17 illustrates the result of increased perceived customer value on the technology adoption and therefore in market penetration of the technology. (McFarlane et al., 2007).



**Figure 17. Increase in perceived value.**

As seen from the figure above, the smaller the customer cost, the higher the perceived customer value, the faster the diffusion of technology and the higher the number of adopters. When one customer is satisfied with the new technology, the communication of its benefits to friends, family and professional in the same area is natural to happen (Lin, 2003).

Firms must always consider the desired profit, but playing with the customer value framework provides great competitive advantage (McFarlane, 2013). Though, increasing the perceived customer value results in profit loss in unit level, the sales of the technology will increase due to the faster technology diffusion. Afterwards, the larger amount of sales, will lead to higher profits. Figure 18 illustrates the explanation above with a practical example.



**Figure 18. Practical example explaining increase in profit due to technology diffusion.**

As observed from figure above, with the current situation (on the left), the company can solely sell 3 units each week due to the current perceived customer value. This then, results in a total profit for the week of 450 Euros. On the other hand, when increasing the perceived customer value, the diffusion of the technology increases, and so also the number of customers. The increase in the number of customers, leads to 600 Euros for the week even though the unit profit is lower. As seen, increasing the perceived customer value leads to more sales and hence, more profits for the company. The issue here is that the diffusion may start at a slower path, thus, the example above is considered to happen in the third or fourth week after the implementation of higher perceived customer value. Therefore, it is implied that there were some lost in the first two or three weeks due to slow technology diffusion. Clearly, when referring to long-term situation, the total profit plentifully increases. (Perla et al., 2015)

The technology acceptance model introduced in section 2.4 gives great importance to the perceived usefulness and perceived ease of use for the actual adoption of a technology. Therefore, successfully penetrating the market with a new technology is also related to the value the customer perceives in terms of usefulness and easiness of the technology. (Surendran, 2012)

Furthermore, Karthikeyan (2016) defends customer satisfaction as a means for faster technology adoption. The more the customer is satisfied with the technology, the more probable is the adoption of that technology. The satisfaction of the customer once again is related to the way the customer perceives the value of a technology. The higher the perceived value, the higher the customer satisfaction, and hence higher the rate of the penetration and the number of adopters of a new technology.

Concluding, it is fundamental to appropriately price a product, so that both companies and customers can get benefits from the offer. Clearly, it is noticeable that a lead to better sales, therefore, a benefit for the customer is as well a benefit for the company.

### **3.3 Customer Value in B2B**

According to Levitt (1969, 1980, 1981), value of products and services is obtained by adding features on them. There are usually five levels of features that can be aggregated in all offers, such as core, generic, expected, augmented, and potential product (Lovelock, 1994). First, core product refers to the basic product and to the intent of the product. Second, generic refers to the qualities of the product, in other words the features the product must have to achieve its main purpose. Third, expected product is related to the expectations of the customers. Fourth, augmented includes all the features that differentiate the product from competitors, such as the brand. Finally, potential product requires looking for different augmentations and transformations in order to improve the final product to please the customer.

While in B2C, the customers are highly influenced by psychological benefits, in B2B the situation is slightly different. B2B customers are more cost driven in their purchases, meaning that they see purchasing as a way to increase their own profits. Therefore, understanding the framework of customer value plays an important role in B2B context. (Anderson & Narus, 1998)

On the other hand, in B2B customer also valorises the long-term relationships with the supplier. Lindgreen and Wynstra (2005) stated that the customers realize the value from long-term relationships, because the factor predictability now is part of the relationship. In other words, the customers know the supplier and the way they do business. In addition, the adjustment to the relationship may lead to new product or service solutions. O'Cass & Ngo (2012) agree with the previous statement, and complemented it by asserting that companies must try to deliver two different types of value: create relationships with business customers and second, collaborate with them. This referred long-relationship and collaboration are a win-win situation for both customer and supplier company. First, because B2B customer can experience more value in the offers. Second, because suppliers are able to predict the processes of the customer based on past experience and to retain existing customers.

In B2B context, managers still constantly face indecisions regarding the way to achieve advantage when delivering customer value. For that purpose, O’Cass & Ngo (2012) gathered from various authors, three particular capabilities which are fundamental for the provision of benefits in the offers.

- Stimulation of product renovation and change (Berry et al., 2006; Damanpour et al., 2009; Ostrom et al., 2010; Song et al., 2009)
- Effectively marketing the offering (Berry, 2002)
- Development of product innovation and marketing capabilities through deep analysis of the market (Ostrom et al., 2010)

First capability refers to developing product renewal, since as previously mentioned, innovation is crucial to grow. Innovation allows the company to align with the constantly changing market requirements. In other words, innovation allows the firm to satisfy clients’ existing and future desires. Besides, product innovation capability plays a fundamental role in order to bring performance value, co-creation value and relationship value. (O’Cass & Ngo, 2012)

Second, marketing capability is considered by O’Cass & Ngo (2012) the procedures involved in marketing activities, such as defining the correct price for products and services, the delivery of the products, the communication of the value, sales and marketing planning. Each company have different marketing skills and knowledge, allowing them to differentiate from competitors and acquire their uniqueness that is quite difficult to imitate. This ability to become unique and difficult to imitate, then increase the value of the offer, and increase the life of the product in the market. Therefore, it is assumed that companies with higher marketing competence can keep better marketing procedures, and hence, better performance, relationship and co-creation value and be ability to communicate it to clients.

Finally, the third capability refers to market oriented focus. This is of high importance for B2B due to the constant interaction with other firms in the market. Understanding the market allows the firms to obtain more value in their offers since by knowing the market and market needs, one can develop exactly what the customers want. (O’Cass & Ngo, 2012)

### **3.4 Value proposition for communicating value**

Due to the constantly changing market, technologies tend to have shorter lives. In order to penetrate the market as much as possible, companies must be able to demonstrate and successfully communicate the customer value. Value proposition is defined by Lanning & Michaels (1988) as the formation of benefits on products for consumers in exchange of the price paid for it. According to Weinstein (2012), the way firms deliver and communicate their value propositions is the most crucial factor for competitive advantage.

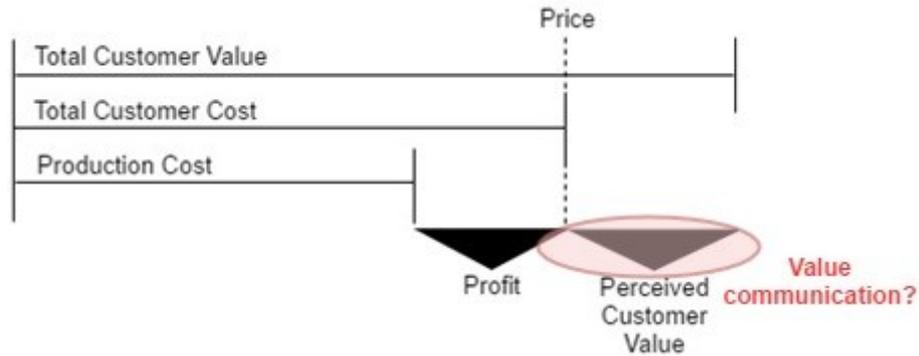
With so many competitors in the market, it becomes difficult to keep uniqueness when creating a technology, explaining the reason why delivering the correct and appropriate value proposition is fundamental nowadays. This is, the way firms elegantly and appropriately communicate the customer value in their offers (Johnson & Weinstein, 2004; Weinstein, 2012). Table 1 presents other definitions of value proposition according to different authors.

*Table 1. Definition of Value proposition.*

<b>Definition of value proposition</b>	<b>Author</b>
“(…) a clear, simple statement of the benefits, both tangible and intangible, that the company will provide, along with the approximate price it will charge each customer segment for those benefits”	Lanning & Michaels (1988)
“(…) the value proposition provided by a business is actually the entire set of resulting customer experiences”	Hopewell (2000)
“(…) the value proposition is a written statement focusing all the organization’s market activities onto customer critical elements that create a significant differential within the customer’s decision process, to prefer and/or purchase the organization’s offering over a competitor’s”	Fifield (2007)
“(…) a value proposition statement is the articulation of the measurable value of the experience that an organization or individual will get from an offering (…)”	Barnes et al. (2009)
“A value proposition is conventionally taken to mean the marketing offer or value promise formulated and communicated by a seller, with the intent that it be accepted by a buyer.”	(Ballantyne et al., 2011)

Despite the different definitions, all authors agree with the fact that a successful value proposition is fundamental to keep the differentiation and success of a business. Basically, communicating the value includes the methods the supplier should apply to make the

customer perceive the value of a product. Figure 19 illustrates customer value framework with focus on the perceived value and on its communication to customers.



**Figure 19. Communicating value.**

Moreover, according to Anderson et al. (2006), there are three types of value proposition: all benefits, favourable points of difference and resonating focus. First, all benefits consists of presenting to the customers the different benefits of the offer. This is the fastest and simplest method to communicate the value to the customers, and it requires small knowledge regarding the customer and competition. Second, favourable points of difference involves deeply understanding the actual needs of the market and the solutions in order to emphasize only the points that actual deliver value to the customer. In other words, the comparison between the benefits offered with those of the competitors. Finally, resonating focus is the most important value proposition. This type of value proposition arguments the most important aspects from the customer's point of view, illustrates, demonstrates and documents the value and finally communicates it. Resonating focus then, requires a deep knowledge about the customer's business.

Following the discussion from section 2.4, according to the epidemic model of technology, the more existing information accessible regarding the new technology, the more the penetration of the referred technology. The explanation behind is that, the more the customer is able to perceive the value of the technology, by fully understanding its features, functions and benefits, the faster the penetration of a new technology and the higher the number of adopters. (Geroski, 2000).

In addition, as referred as well in section 2.4, observability can be improved through effective communication of the value. Successful communication of the values of a technology improve almost all the perceived attributes of innovation from Rogers (2003). In other words, efficient communication emphasizes the relative advantage, make the customers' behaviors more compatible with the new technology and reduce the perceived complexity. Finally, observability is based on communication, therefore it improves the technology observability as well. Therefore, it can be stated that effective communication increases the technology diffusion by improving the customer's perception of value.

## 4. TRAINING MATERIAL

### 4.1 Training

The academic literature methodically explains the concept of training. Business usually see the skills and capabilities of the work force as the lever of growth or as a large contributor for economic progress. Therefore, it is of extremely importance that employees are educated to do their tasks. On the other hand, new technologies require continuous learning. (Acemoglu & Pischke, 1999)

Jacobs (2003) claims that achieving or expanding great levels of employee competence is one of the most challenging topics for organizations. Thus, training increasingly become essential in an organization. Different authors present various views regarding training, shown in Table 2.

*Table 2. Definitions of Training.*

<b>Definition of training</b>	<b>Author</b>
“Training indicates any process by which the aptitudes, skills, and abilities of employees to perform specific jobs are increased”	Jucius, 1955
“Training is the act of increasing the knowledge and skill of an employee for doing a particular job.”	Flippo, 1984
“(...) training is one of several responses an organization can take to promote learning.”	Armstrong, 1997
“Training is in some respects different from schooling.”	Acemoglu & Pischke, 1999
“Training is the external information that is presented to individuals for them to respond to.”	Jacobs, 2003

Process to achieve “(...) desired standard of efficiency, condition or behavior by instruction and practice”.	Hackett, 2003
“The specific content of the training (...) depends on the attributes, needs and prior knowledge of the target group in question.”	Bergo et al. 2006
“(...) training is only part of a solution to meet professional needs identified in needs assessment.”	Hamza, 2012
“Training objectives tell the trainee that what is expected out of him at the end of the training program. Training objectives are of great significance from a number of stakeholder perspectives: trainer, trainee, designer, evaluator”.	Karthik, 2012
“Training is the nerve that suffices the need of fluent and smooth functioning of work which helps in enhancing the quality of work life of employees and organizational development too.”	Kulkarni, 2013

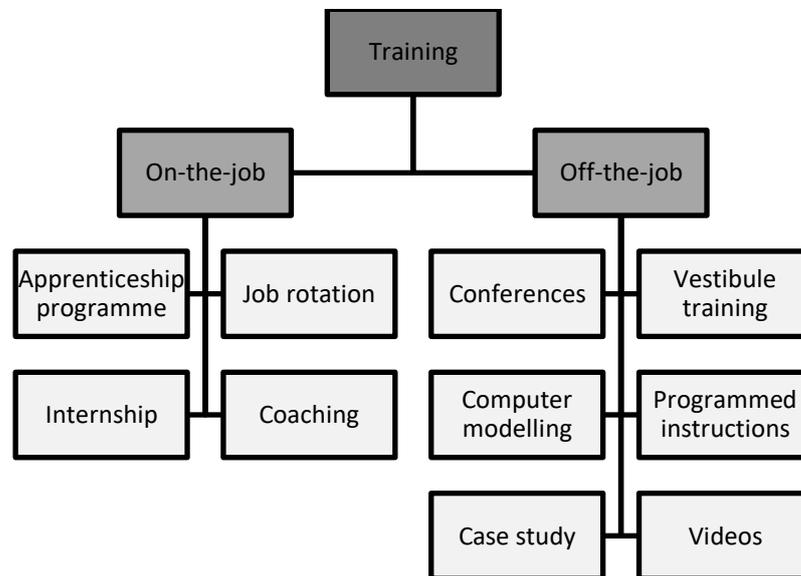
The concept of training is discussed by different authors. Thus, some characteristics of appropriate training are identified below.

- It differs from schooling
- It expects responses from the individuals
- Its main objective is to increase efficiency and improve behavior and practice
- Used to meet professional needs and to promote learning
- Its features depend on the target population
- It improves the quality of life of the employees and of the organization
- Increases the knowledge and skills of the employees in a particular task
- What is expected from the employee must be said only at the end of the training programme.

Moreover, according to Kulkarni (2013), there are four main objectives of training, such as individual objectives, organizational objectives, functional objectives and social objectives. First, individual objectives are focused on the personal goals of the employees.

Helping the employees achieving their personal goals, enhances the individual contribution to the organization. Second, organizational objectives support the organization or firm with its main goal by increasing the effectiveness of the individuals in their tasks. Third, functional objectives maintain the contribution of the department at a suitable level to the organization's requirements. Finally, social objectives certify that the firm is ethically and socially in charge of the requirements and challenges the society brings.

In addition, there are two types of training, on-the-job training and off-the-job training. First, during on-the-job training, the individual gets instruction in its workplace, typically by observing the tasks, being instructed by specialists on the matter, and then practicing them. Second, off-the-job training refers to instructions away from the workplace. Off-the-job training could then occur in a training room or at a distinct location. Figure 20 illustrates the two types of training and what those include. (Heery & Noon, 2008)



**Figure 20. Types of training (modified from Gandhi, 2016).**

As seen from the figure above, there are many methods of training, both on-the-job and off-the-job training. First, during an apprenticeship programme the instructor performs his or her tasks normally, and the trainee observes. As the trainee observes and learns the task, he or she slowly starts taking over the task, and the instructor becomes the observer. Once the trainee gets adapted to the task, he or she gets full responsibility on the task. Second, internship, is an agreement between a potential professional (intern) and a corporation, in which the intern is supposed to learn with the day-to-day activities of the company or industry. Through an internship, the interns gain experience in the area they are performing. Third, in job rotation method, employees are supposed to move between jobs within the company in a planned way. This method allows and expose employees to different environments and jobs, allowing them to get wider variety of skills. Fourth, coaching refers to a training method in which a particular supervisor is associated to a

trainee. The supervisor is then supposed to train and provide feedback to trainee during his or her tasks. (Gandhi, 2016)

Fifth, conferences refer to meetings in which several people debate a subject. In a conference, every participant analyses and discusses in their own view point the different issues regarding the main topic. Sixth, in vestibule training, also called near-the-job training, a simulated setup is arranged, similar to the real plant. In this type of training, the trainee learns the tasks in a similar environment to the real work place. Seventh, computer modelling is a software designed to simulate a real work situation. Eighth, programmed instructions usually comprise manuals (online or physical) with instructions regarding the tasks that should be performed written by a researcher on the topic. Ninth, in a case study, generally, a problem faced by a real or non-real company is presented to the trainee. Therefore, the trainee must provide solutions to solve the case study. Finally, videos comprise audio visual material with information regarding the different tasks that the trainee must perform. (Gandhi, 2016)

Usually, on-the-job training or informal training is focused on the work. In other words, the instructor must first complete the task. In a case that something goes wrong during the training, the trainee must get out of the way, and allow the instructor to complete the work. Thus, the training must continue only after the solving the problem. Also, during on-the-job training, the work is the responsible for setting the structure of training. If some event happens during the task performance, the training should follow the same order as if it was a normal work situation. Besides, in this type of training, the instructor relies on the experience he or she has, and hence, the chosen training method depends on the instructor. (Sisson, 2001)

On the other hand, during off-the-job training or formal training the instructor is not performing any task besides presenting the training material, which is supposed to educate the employee. In this type of training, the trainee can fully focus on the information transmitted from the instructor. Also, larger number of people can learn at the same time. Off-the-job training is then focused on information and knowledge transmission and it is structured. (Saks & Haccoun, 2010)

Despite the advantages and disadvantages associated to the different methods, Saks & Haccoun (2010) defend that effective training programs often combine both on-the-job training and off-the-job training. Also, one important aspect when making decisions on training material, is that one must always take into account the desired return on investment (Moran, 2014).

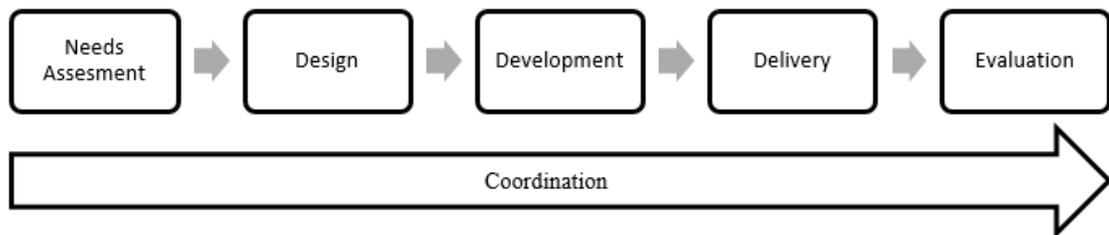
## **4.2 Training material**

As explained in previous section, training is the action of increasing the knowledge and skills of an individual or group for performing a specific job. According to the preference

of the company or instructor, different material can be used to support training (in both on-the-job training or off-the-job training). Therefore, training material can be defined as a group of resources that help answering questions concerning processes, services or products and that educate individuals regarding concepts and practices associated to information skills. (Somoza-Fernández, 2015)

As pointed out, whether the company adopts for on-the-job training, off-the-job training or a combination of both methods, there are many kinds of training materials to decide for. One example of training material for on-the-job training in an industrial environment, is the production machine itself in which the trainee is learning the task. Other examples of training material used during off-the-job training are videos, manuals with programmed instructions, computer modelling, such as demo software, slides and black boards.

When building and choosing the appropriate training material, there are many aspects related to the audience to take into consideration. Hamza (2012) identifies various phases in the development of training material, presented in Figure 21.



*Figure 21. Building process of training material.*

As observed in the figure above, the first step in building training material is to identify the current need. Training needs assessment is done by identifying the knowledge gaps and recognizing the outcome (Table 3).

*Table 3. Training Needs Assessment (modified from Hamza, 2012)*

<b>Audience</b>	Identify the target public for the projected training.
<b>Existing roles</b>	Identify the current roles the target public do in their jobs.
<b>Knowledge gaps</b>	Identify the existing gaps between what the public audience knows how to do and what do they need to know to perform their jobs successfully.

<b>Outcome</b>	Recognize if the training material can fill the knowledge gaps.
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In other words, finding out the existent gaps between what the audience knows and what they need to know to carry successfully their roles and understand if the training material fills the existent gaps. In order to do so, it is crucial to first of all identify the audience and their current roles. It might be challenging to determine the needs of the identified audience, thereby there are various techniques to obtain the necessary information, now identified below. (Hamza, 2012)

- Resort to earlier experience with comparable groups
- Get information through informal discussions with professionals in the same network
- Surveys and interviews
- Focus groups
- Observation
- Learn about critical incidents
- Find data online regarding needs of that particular group

Secondly, Hamza (2012) also states that diverse groups have different characteristics. These characteristics depend on various aspects, such as:

- Experience
- Culture
- Education
- Location
- Mind set
- Constraints

First, a group with experience in a specific job, will need different training material than a group with no experience at all. Second, the culture also influences the way a training material is prepared. The way things are explained during, for instance, a training session must vary according to the culture. Third, the same happen with education. An educated group accept easily some appropriated concepts and terms. On the other hand, a non-educated population may not recognise the purpose of training material if they cannot understand it. Fourth, location influences for instance the language of the training material. In addition, people in some locations are more open minded than others, and have diverse ways to perceive things. Finally, also constrains perceptibly influence the design of the training material.

In addition, people learn differently and each individual may have different preferred styles towards learning. Thus, a successful training material must include different approaches. There are four types of learners and depending on the matter, people may be one or another. The four types are presented below.

- Doer
- Feeler
- Thinker
- Observer

First, a typical doer appreciates to be deeply involved in the learning process, be informed in a clear and concise way and be able to understand how the theory can be applied in real life situations. Second, a feeler is more people-oriented, communicative and considers feelings and emotions. This type of learner favours exposed and unstructured learning environments. Third, a thinker valorises the logic and reason and appreciates to share his or her opinion resorting to concepts, analysis and evaluation of the matters. In addition, a thinker prefers to work independently. Finally, an observer, as the name suggests, enjoys listening and observing. This type of learner is usually discrete and takes time before starting to participate, since he or she favours learning through discovery. (Hamza, 2012)

Since people learn in diverse ways, it is fundamental to plan carefully the training material, so that different learners can get the information and effectively acquire knowledge. Training material is intended to learn new tasks or improve the quality of a performed task.

The second step in the building process of training material is the design, the planning and structuring of the required training materials, according to the needs assessment. Design includes respectively, the identification of the desired goals, the choice of the content and the choice of the material that will allow to achieve the goals, taking always into consideration the needs of the target audience. In addition, there are four steps in designing proper training material, such as understanding the main goal of the training, specifying the main topics of the training, identifying specific topics for the training and reflect about how the audience can prove their learning.

The third step in the building process of training material is the development of the training content. According to Hamza (2012), development is the most time-consuming phase since draft material may have to deal with multiple revisions and involve various entities, before being ready for use. Using appropriate appealing material for the target audience may influence the understanding and learning of the content. In other words, if the same information is delivered through an appropriate material it might be more successfully assimilated.

The fourth step involves the delivery of the training material. For instance, if the design phase is compared to the development of a blueprint for a house, and the development phase is compared to the actual construction of the house, delivery is the moment when people is invited into the house to experience what was created. Delivery, then can be defined as the conveyors of the information or the actual training material method used to deliver the required information. (Hamza, 2012)

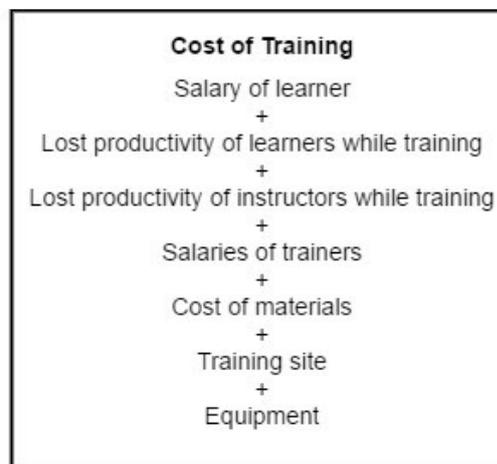
The fifth step in building training material is evaluation. Evaluation of the training session or training material can be done through feedback. In the short-term, the participants are supposed to give their opinion on the training. In the long-term, the evaluation of the training is made by observing the improvements in the processes.

Finally, as observed in Figure 14, coordination must be part of the all process when building training material. Coordination can be defined as the arrangement of the various elements of training to enable them to work successfully together.

### 4.3 Benefits of investing in appropriate training material

As previously mentioned, employees are the most important resource of an organization. Without well-trained employees, an organization cannot succeed in such a competitive market. In other words, without well-trained employees, products are produced with low quality and services provided are mediocre. Therefore, the more a company invest in appropriated training material, the more the customers can perceive the value of a service or a product, hence increasing the diffusion and sales of that service or product.

According to Williamson (2007), training is expensive. There are various costs involved, such as the salary or wages of the learners, lost productivity of learners while the training occurs (mostly in off-the-job training), lost productivity of the instructors during training, salaries of the trainers for formulating and conducting the training, cost of materials, training site and equipment (Figure 22).



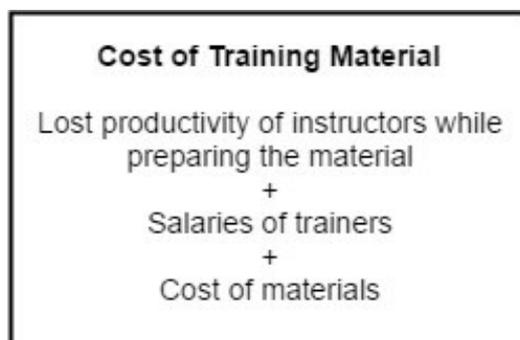
*Figure 22. Cost of training.*

However, if the training material is appropriate and meet the goals and objectives of the company and employees, the investment is worth it. Due to the improved skills of employees, company can generate more sales and employees get more experience, resulting in a win-win situation. Aguinins & Kraiger (2009), also agree that investing in training and training activities bring different benefits on the performance of both individuals and teams.

Current literature, emphasizes increased productivity to the organization as the main benefit of training. First, continually educated employees in current knowledge and abilities to do their jobs are extremely productive. Well-trained employees work more competently, rarely make mistakes, waste small amount of material and often provide innovative ideas. Second, due to training, employee job satisfaction increases, and hence, so the productivity. Training leads to more involvement and excitement around the job, boosting motivation to support the organization's mission. By investing in training, management shows respect for workers' skills, hence increasing employees' self-esteem, morale and feelings of job gratification. (Aguinins & Kraiger, 2009)

In addition, training intensifies organization loyalty, reducing employee turnover. Usually, employees tend to value chances to acquire new abilities, and thereby, training helps to retain the best employees. In times of scarce high-quality employees in the market, training in other areas can be developed for existing workers. This way, also recruitment costs are being saved. Lastly, since training leads to highly educated employees, the company brand's image is also enhanced due to better quality products and services. (Aguinins & Kraiger, 2009)

As mentioned, training material supports training, but it can also be developed for documentation of the processes in the company. In other words, the employees can consult the training material without participating in a training session. In case of the development of training material without running a training session, the costs would be related solely to materials, salaries of trainers who must prepare the material and lost productivity of instructors while preparing the training materials (Figure 23).



*Figure 23. Cost of training material.*

In case an employee is not sure about a process or a task in a company he or she may consult the training material and figure it out independently how to do it. Moreover, in case the company decides to invest in training, the training materials to support the session were already developed previously.

The different types of training material have distinct benefits. Benefits associated to the production machine itself, videos, manuals with programmed instructions, computer modelling, such as demo software, slides and black boards are discussed below. (Gandhi, 2016)

- **Production machine**  
Effective for learning a new technology and new procedures. It allows the trainer to recognize if the learner understood how to work in practice with the machine. The learner has a more practical approach, hence increasing his or her sympathy with the machine. Moreover, the learner can understand how the technology actually works in different situations.
- **Videos**  
Allow the employee to learn without the need to be present at work and can be played as many times as needed without producing costs. In other words, in case the employee did not understand the procedure at first, the video can be played over and over until the procedure is understood. Moreover, videos are more interactive and attractive than manuals. Through videos, employees can understand a procedure in fewer time than by reading a training manual with specific instructions.
- **Manuals**  
Allow the employee to learn without the need to be present at work and it can be consulted as many times as needed. It is economic to produce, and it can serve as a reference document in the work place. Moreover, in case of a discussion regarding the technology or procedure, the employee can fully pay attention during the discussion instead of being taking notes, since all the information required is written in the manual.
- **Demo software**  
Demo software, or technology demonstration, is a rough example of how the real technology should work. In other words, it is an approximation to the real machine. With the demo software, employees can observe how the real technology would work in different situations, according to a predefined programming code. The more complex the code, the more the similarity with the real technology. Investing in a demo software is more economic than investing in a real machine

only for training, and employees may still get a large knowledge on the matter, due to its proximity with the real procedure or technology.

- **Slides**

Permit transfer of information to the employees during the training session, which can be documented and consulted afterwards. Employees learn the procedure or new technology by listening and interacting with the trainer. In addition, substantial number of learners can assist to the presentation, triggering knowledge to higher amount of people.

- **Black boards**

Allow high interaction with the instructor, since at time of the training session, both the instructor and learners can explain their thoughts publicly. Investing in a black board, however, might be quite “old-fashioned”, reducing the credibility of employees in a company developing a high-end technology. In addition, it is not supposed to be consulted after the training.

Clearly, investing in appropriate training material brings benefits to the company. The higher production and quality in products, services and procedures lead to higher customer satisfaction, and hence, higher sales.

#### **4.4 Training material as a tool for technology diffusion**

As discussed in section 4.2, training material is a group of resources which support training; being training the action of enhancing knowledge and skills of an individual or group for performing a specific job (Somoza-Fernández, 2015). The academic literature refers to training as any type of information presented to individuals to increase their knowledge and practices, whether in the work in environment or in life (Armstrong, 1997; Jacobs, 2003; Hamza, 2012; Somoza-Fernández, 2015).

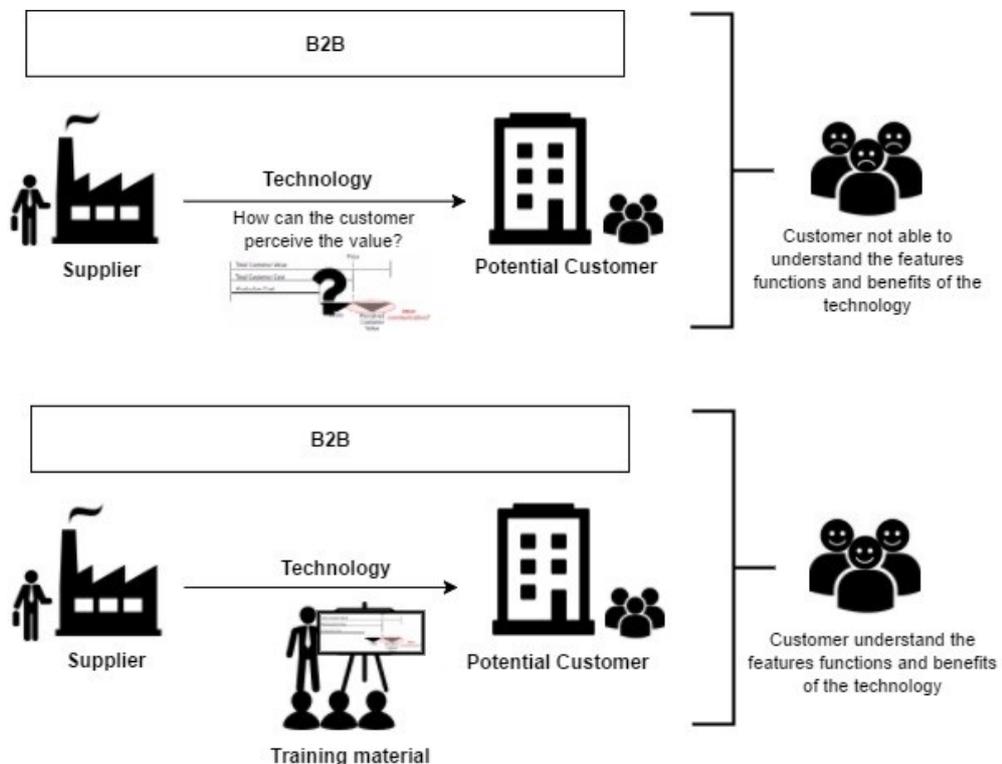
However, there is no academic literature available regarding the use of training material to deliver the value proposition of the companies' offers. Most authors consider training as a program, usually paid by a company, to increase the skills of the employees within the same company. In other words, companies invest in training material in order to train their own employees, so that the firm itself performs better. (Philips, 1997; Sisson, 2001)

As mentioned by Grönroos (2009), in order to create value, the supplier must be involved in the customer's processes, such as purchasing, billing, usage, maintenance and product's or service's advice. DeMaio (2001) stated that In B2B context, companies' customers are as well business, rather than final consumers. Geroski (2000) mentioned that the number of adopters of a technology increases when the customers are able to perceive the value of the new technology by understanding its features, functions and benefits. In addition, Aguinis & Kraiger (2009) defend that the investment in training

material brings different benefits for companies related to improvements in the skills of employees. Employees learn features, functions and benefits which allow them to perform better in their roles.

Therefore, if the training material regarding the technology of the supplier is directed to the customer (which is also a company), the customer can understand its features, functions and benefits, and therefore perceive the value of the new offered technology easier (Figure 24). Besides, by creating training material for the customer, the supplier would be involved in the process of value creation, by assisting with purchasing, billing of the customers' offers, usage of the technology, maintenance and mostly with product's advices. Hall and Khan (2003) assume the role of communication for technology diffusion. However, they did not recognize or study the role of training material in technology diffusion. Since the training material targeted to customers is basically a way to communicate with them about the features, functions and benefits of the technology, there is no uncertainty that it can be used to effective communication and consequently, technology diffusion.

As observed in the Figure 24, the supplier tries to sell a new technology to a potential customer. Due to the complexity of the technology and since it is new to the market, customers are not aware of its features, functions and benefits. This results in lack of perceiving the customer value of the technology, and hence the customer does not purchase the technology.



*Figure 24. Training material as a means to deliver value proposition.*

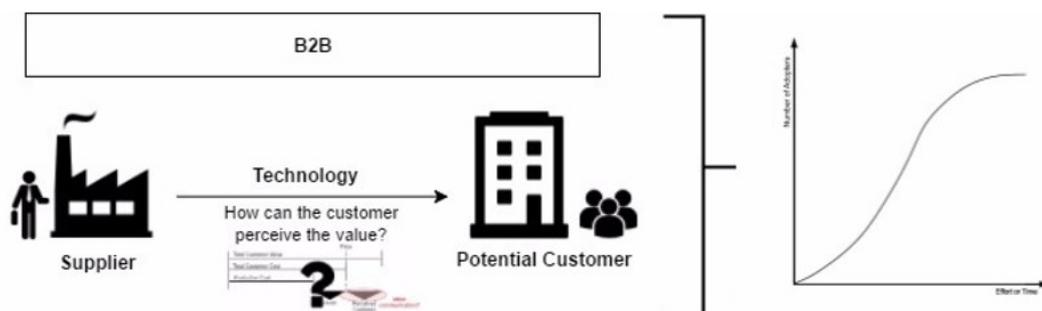
Based on the Technology Acceptance Model (TAM) from Davis (1989), the attitude toward using, which will result in the actual purchase of the technology, depends mostly on the customer's perceived usefulness and customer's perceived ease of use. On the other hand, the customer perceived attributes previously discussed from Rogers (2003), also influence the acceptance of the technology. Training material provides an opportunity to communicate information regarding the features, functions and benefits of the new technology, which allows the customer to fully understand it (ease of use) and its benefits (usefulness), resulting in higher probability to purchase the new technology. Moreover, it is natural that satisfied clients share their great experience with the technology with familiars, friends and work colleagues, resulting in faster technology diffusion (Hall & Khan, 2003). Therefore, it can be stated that training material is a great transmitter of the value of a new technology (Figure 25).



**Figure 25. Satisfied customers lead to faster technology diffusion and higher number of adopters.**

As shown in the figure, individuals able to understand the features, functions and benefits of the technology will result in faster adoption and higher number of adopters of the new technology (right side of the figure). On the other hand, the S-curve will occur at a slower and less extensive diffusion if the individuals cannot perceive the value of the technology (left side of the figure).

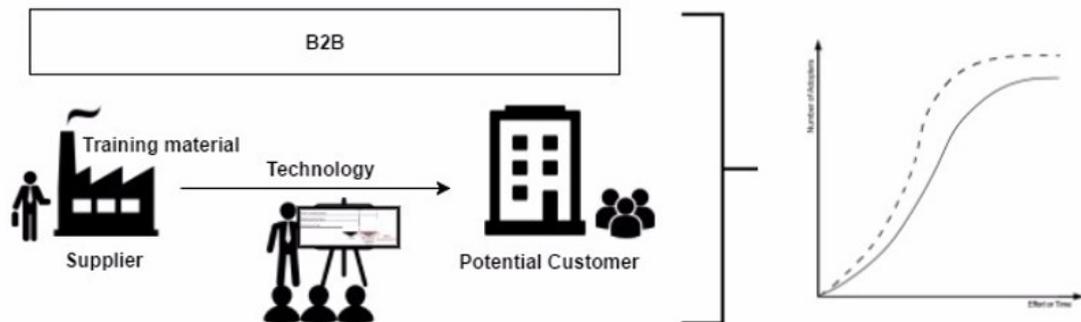
Figure 26 illustrates the framework in which the company is not able to effectively communicate the value of the technology to the potential customer. Consequently, the technology S-curve will occur at a slower and less extensive diffusion.



**Figure 26. Company not able to communicate the value of the technology.**

As observed, the technology will still diffuse since it creates value for customers. However due to the ineffective communication of the value proposition from the supplier, the technology diffusion happens at a slower path and the number of adopters is smaller than when effectively communicated.

On the other hand, when the value proposition is effectively communicated, through the use of training material, the technology S-curve is faster and more extensive. Figure 27 represents the situation.



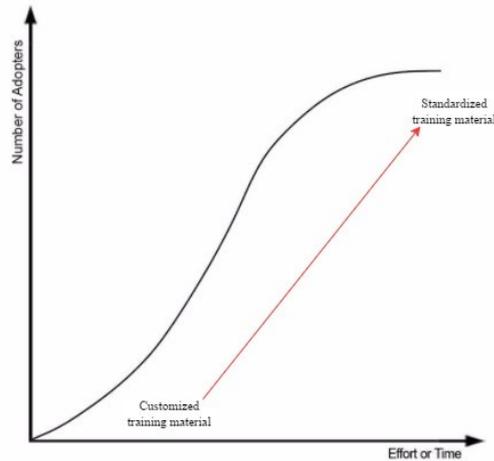
**Figure 27. Theoretical framework of the thesis.**

The increase in technology diffusion due to investment in training material will then have different consequences for the company, such as:

- Higher sales and profits of the referred new technology
- Enhance of the company image
- Need for less investment in advertising campaigns
- Less costs related to customer assistance

First, the higher the number of customers adopting the technology, the higher the revenue and profits for the company. Second, the firm brand's image improves since the company gets recognition for helping the customers. Third, due to the technology diffusion caused by the training material, the need for advertising is reduced. In other words, training material is as well being used as a kind of advertising. Finally, when training material is used to instruct the B2B customers regarding the offered technology, they will not need so much sales assistance as if they would not have had access to the training material.

According to the theory, training material to trigger technology diffusion is effective. However, different training material must be provided at different stages in the PLC curve. This is, the more going on the right in the PLC curve, the better training material is needed. In other words, training material must become more standardized depending on the larger time and effort involved (Figure 28).



**Figure 28. Development of training material for technology diffusion.**

Sievänen (2004) defends that a customized product is a modification in a standard product according to the customer needs and his or her concept of value. In other words, since diverse customers value different features, the product will vary depending on each individual need. The main goal of customization is to offer products that match the best individual customers and their needs (Ahlstrom & Westbrook, 1999; Westbrook & Williamson, 1993). On the other hand, standardization is the opposite of customization. Therefore, standardized products look all alike, and do not differ according to the customer request.

According to Lampel & Mintzberg (1996), there are five different customized strategies, which go from pure standardization to pure customization. In pure customization, the product is customized from design to distribution. On the other hand, in pure standardization the products are all similar. Thus, the five different customized strategies are, in order from more standardized to inexistent standardization, pure standardization, segmented standardization, customized standardization, tailored customization and pure customization.

As seen in the figure above, at the initial phase of the market penetration curve, the training material must be more customized according to the needs of the customers, since the product is still unknown. In the beginning, there is the need to invest in training material that actually creates an impact in technology diffusion, therefore it must be customized according to the specific B2B customer. However, as the technology starts to diffuse, the training material must become more standardized. At the last stages, everyone is more familiar with the “new” technology, and thus, no need for such high investment. As more effort or time is spent with the technology, the more independent the customers can be.

## 5. THE CASE COMPANY

### 5.1 The Case Company

The company was established in 2008 in Finland, and offers healthcare services to healthcare professionals. The start-up company manufactures automatic medicine dispensers and supporting software which allows elderly to live safely at their own homes. The robot provides the right medication at right time for patients who are in long-term medical treatment. According to the website of the company, the medicine dispensing service is the only solution offering automation in care processes at home. It is important to mention that all the blank spaces in the following figures regarding the company refer to company's name.

The machines are manufactured in Salo (Finland), and the company operates exclusively in the Nordic countries. As observed in Figure 29, from the company's website, the service is provided in numerous districts in Finland, Sweden and Norway.



*Figure 29. Countries which adopted the technology (company website).*

Moreover, due to its innovative service, the case company received the Health Innovation Award 2017 in Helsinki. The service is targeted to patients with dementia, elderly and persons in long-term medical treatment, who receive home care and wish to take the correct medication. However, the service does not provide a reliable solution if the patients suffer from memory disorder. In the latter case, the healthcare professionals must visit the elderly at the time of medication, tying u resources. It is mainly delivered to home care organizations, but it can also be offered to individual users.

Their business model is built in a way that the company do not sell the robot to the customers. Instead, the company leases the machine and provides the controlling and communication software during the leasing term. This way, the customers can only order a specific amount of medicine dispensers according to the amount of patient on a “subscription basis”, rather than investing in an expensive machine. The monthly service includes rent of the robot, data transfer costs, accessibility to telecare system, maintenance, customer service and remote monitoring from the company’s control room. (Nyuppieva, 2015)

The referred automatic medicine dispenser is a robot which has been revolutionizing medical treatment. Due to the advances in Medicine, aged population number has increased over the past years (Piggott & Woodland, 2016). Along with that fact, the number of patients using different medicines has augmented. Therefore, the purpose of the medicine dispenser, is to remind the patients to take the various medicines. As pointed out, this technology provides the correct medication at right time in the right dosage, for patients who are in long-term medical treatment. Figure 30 presents the medicine dispenser.



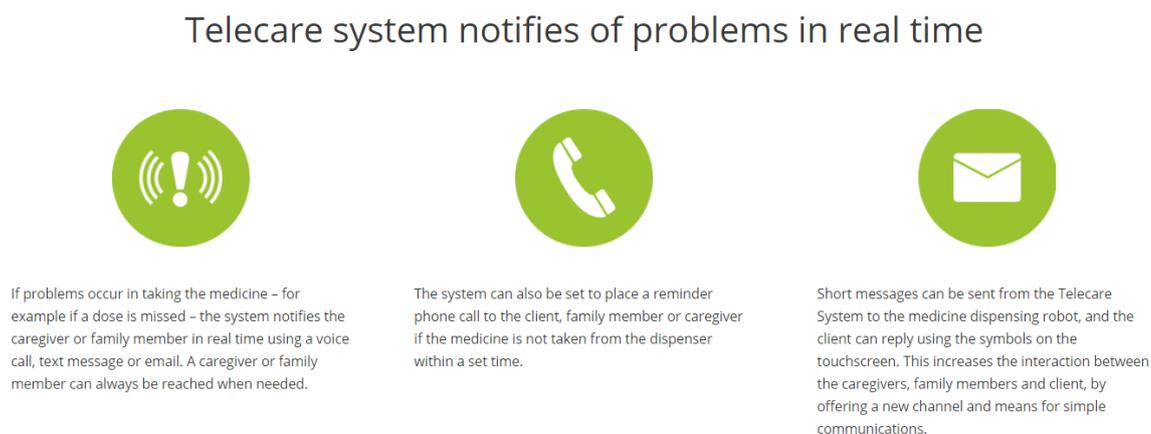
***Figure 30. Medicine dispenser (company website).***

The robot uses internet connection in order to transmit the specific customer data via the telecare system to the homecare organization. Moreover, as notice in figure above the machine has a large dimension. According to the COO of the company, this is due to the targeted end users. Elderly accept better a larger machine rather than a smaller one, which therefore may increase the acceptance of the technology. If the elderly desires the machine, it is easier to achieve the acceptance of healthcare professionals.

The medicine dispenser informs the patient in his or her own language to take the medicine, with clear instructions of how to do it. In addition, the large display allows the patient to visualize when the medicine has to be taken. The medicine dispenser is set in the patient’s home and it is supposed to emit the dosages according to the doctor prescription. Concluding, the robot is characterized as a locked medicine cabinet which reminds the end user when it is time to take the medication and solely opens at the appropriate time to take the medicine.

For the proper operation of the service, three elements are brought together, such as the referred automatic medicine dispenser, a company's telecare system and pre-packed multi dose sachets.

The purpose of the company's telecare system is to control the patient's data, and therefore monitor the progress of medical treatment of the patient. Besides, it can also be used for remote care and as a communication tool between the healthcare professional and the patient. The system connects with the robot through internet connection and if necessary, family member can access the information. The company website provides information regarding the telecare system, as shown in Figure 31.



**Figure 31. Telecare system (company website).**

As observed, if there is some issue related to taking the medication, the system contacts with the healthcare professional or familiar in real time, through voice call, text message or e-mail. In addition, the telecare system can be configured so that the patient, healthcare professional or familiar receive a voice call in case the patient did not take the medication within a defined time from the dispenser. Finally, brief messages can be sent to the medicine dispenser and therefore the patient can reply by using the symbols on the touchscreen.

Lastly, the pre-packed multi dose sachets are provided by local pharmacies, which use an automated dose dispensing, commonly used in Finland. Basically, the doctor prescribes the medicine for the patients, including how it should be taken, and the pharmacy organizes strip-packed medicine pouch rolls, which can contain medicine of maximum two weeks, for the specific patients. Afterwards, the healthcare professionals, in close cooperation with the pharmacist, makes a more detailed daily schedule for the medication. When the information is sent to the pharmacy, the pharmacy packs the medicines into a small disposable sachet, resulting in medicine pouch roll. Then, the healthcare professional loads the machine of each patient with the specific strip-packed medicine pouch roll. Figure 32 shows the pre-packed multi dose sachets.



**Figure 32. Pre-packed multi dose sachets or strip-packed medicine pouch roll (company website).**

As observed, each sachet contains a barcode, the patient's name printed and the date and time when the pills should be consumed, which allows the machine to read the information regarding the medication, dose and time of taking the medicine. The automated dose dispensing ensures there are not human errors related to dispensing the medicines. In an improbable case in which the machine is not able to read the sachets due to bad printing, the support staff of the company case may look at the sachet online to manually instruct the robot what to do (if the text is readable with human eye) without the home care organization even noticing. On the other hand, if the text is not readable by the company case staff, the medicine dispenser will be stopped and the home care organization informed.

## 5.2 Service provision

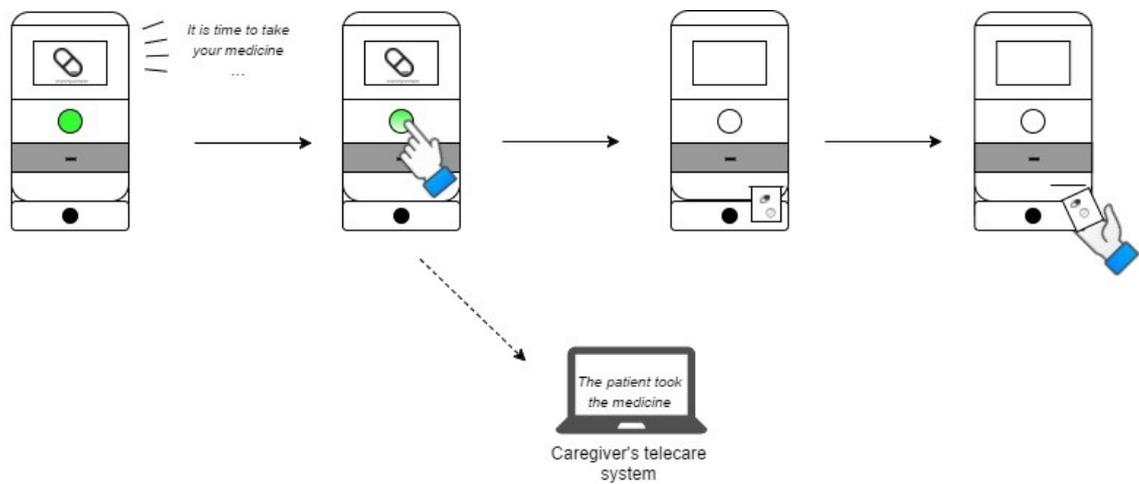
For the service provision, three elements were identified above. Figure 33 brings the three referred components together.



**Figure 33. Required elements for the service provision.**

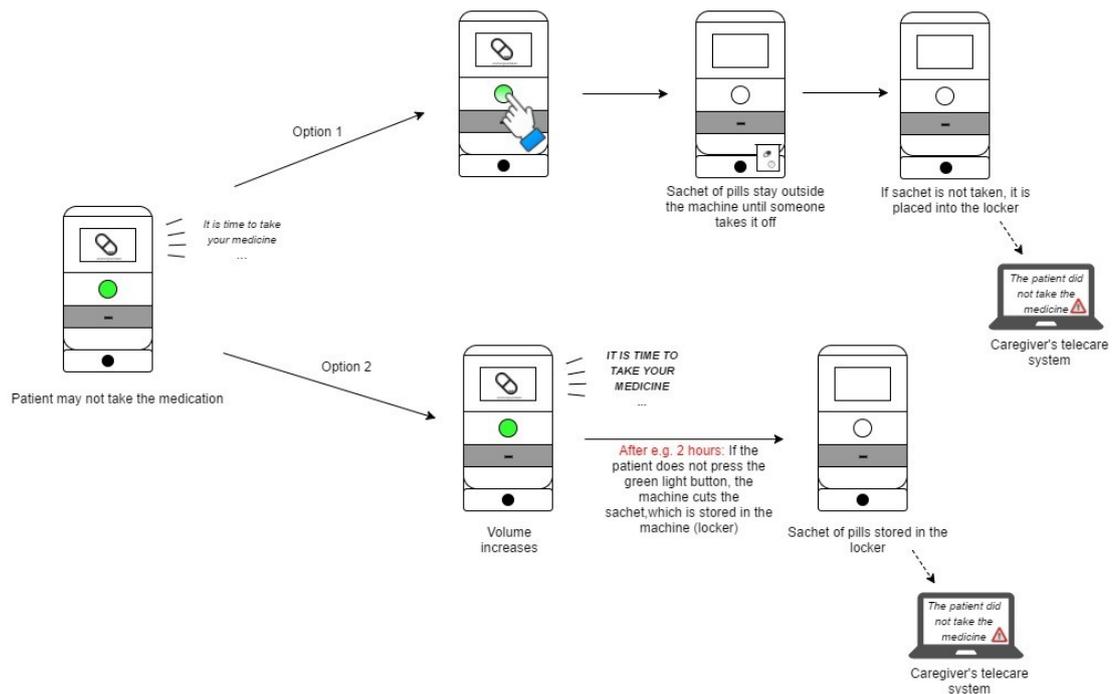
As shown in the figure above, the mentioned three elements must be integrated together. The pre-packed multi dose sachets used by most of home care organizations are compatible with the robot. The pre-packed multi dose sachets must be placed into the automatic medicine dispenser by caregivers and then the medicine dispenser uses machine vision to read the printed text on the sachets, in order to check that the sachets are for the right patient and when the next dose must be taken. The fact that the operations of the robot are based

on machine vision is fundamental, since there is no need for home care organizations to do any programming regarding when to take the medicine. It is responsibility of the pharmacy to print the date and time on each sachet according to the doctor prescription. Hence, the medicine dispenser uses that information. Afterwards, the robot provides the medicines accordingly. When it is time to take the medication, a green light pops up, an alarm sounds and information on the dispenser's display appears to remind the patient to take the medication. The information and further instructions to take the medicine, audible and readable, are given in the patient's native language. Afterwards, the patient is supposed to click the green button, so that a sachet is issued and a message sent to the home care professional or organization's telecare system (Figure 34). This information is fundamental, so that the home care professional understands whether the patient removed the medicine or not. Further actions will depend on the home care professional or organization.



**Figure 34. Integrated system of the service.**

Figure above shows how the automatic dispenser works in case the patient takes the medication properly. However, it might be possible that the patient does not take the medication. Figure 35 presents the behavior of the machine in that case.

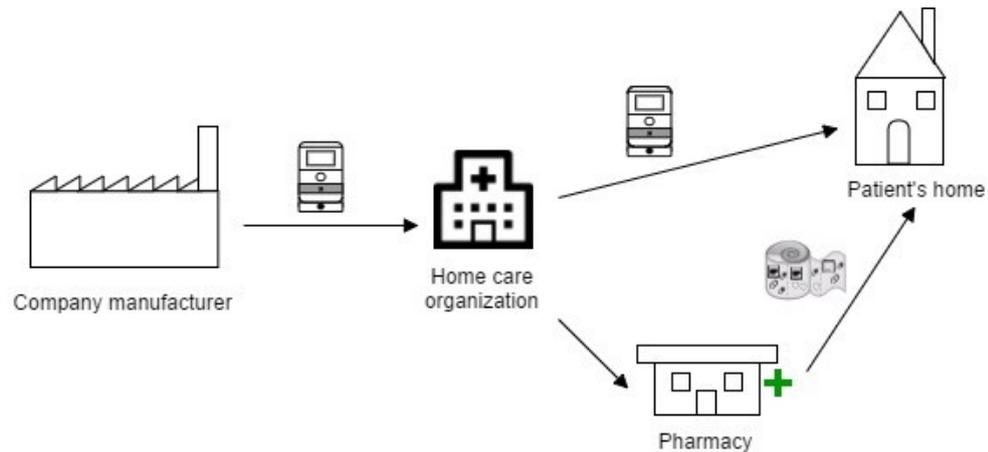


**Figure 35. Machine behavior in case the patient does not take the medication.**

As seen in the figure above, the patient may not take the medication from the machine. On one hand, the patient may click the green light button, but do not take the sachet from the machine. In this case, the sachet of pills is cut and it remains outside the machine until is collected. After some time, if the sachet is not collected, it is placed into the locker and a notice is sent to the caregiver's telecare system informing that the patient did not take the medicine. On the other hand, the patient may not press the green light button at the time to take the medication. In the latter case, the volume increases over the time as a reminder for the patient that he or she must press the green light button and take the medication. If the patient does not press the button, a message is sent to the healthcare professional or organization informing that the patient did not take the medication yet. After two hours, the machine automatically cuts the sachet of pills and place it in the locker, inside the machine. In this case, the sachet of pills is never emitted.

### 5.3 Service delivery

As previously mentioned, the company is the responsible for manufacturing the machine, however, other parties are needed in order to deliver the service effectively to patients. The automatic dispenser is placed in the patient's home by a home care professional or organization, the customers of the dispenser. The service basically helps these, usually public, organizations to reduce the number of home care visits to the patients, consequently reducing the resources consumption of these organizations. Thus, the home care professional or organization is the responsible for collecting the multi dose sachets from the pharmacy and placed them into the machine. Figure 36 illustrates the network for delivering the service.



**Figure 36. Delivering the service to patient's home.**

As shown in the figure above, the company is merely responsible for manufacturing the machine. Thus, the typical customer of the service is a home care unit of a public-sector healthcare organization (Nyuppieva, 2015). Moreover, according to Nyuppieva (2015), the main objective of healthcare system is to confirm well-being for the society. The financing of these organizations is granted by public budgeting and therefore, the money is supposed to be used wisely. The medicine dispenser allows the mentioned objectives: improved service for final users and less workload of the healthcare professionals, resulting in lower costs.

As observed in the figure, the home care organization and the pharmacy are in charge of allocating the medication for each particular patient in sachets according to the doctor's prescription. When these pre-packed multi dose sachets are prepared, the home care professional or organization must pick them up from the pharmacy, transport them to the patient's home and place them into the machine.

Through the use of the medicine dispenser, number of home care professionals visiting the patient's home can be reduced considerably, since the machine can now assume the role of giving the prescribed medication to the patient. Nevertheless, the home care organization plays an important role in the provision of this service. The main responsibilities of the home care professional would then suffer a slightly change.

- Grab the pre-packed multi dose sachets from the pharmacy
- Place the pre-packed multi dose sachets into the machine
- Verify if the patient took the medication (telecare's system)
- Act accordingly in case the patient did not take the medication
- Refill the automatic medicine dispenser

First, as previously discussed, the home care professional must go to the pharmacy to get the sachets of each particular patient. Second, the sachets must be placed into the dis-

penser. The dispenser has two distinct compartments, which facilitate the refilling process, and normally, must be loaded each fortnight. Third, the home care professional is also responsible to check whether the patient took the medication (information received in the caregiver's telecare system when the patient presses the green light button). Fourth, in case the caregiver realized that the patient did not press the green light button, he or she should act accordingly (Figure 35, option 2). This is, it is responsibility of the caregiver to understand whether there is the need to go to the patient's home to give the medication. In case the home care professional finds it crucial to visit the patient to administer the medication, he or she must open the automatic dispenser and take the sachet from the locker placed in the machine, and then give it to the patient. Finally, once the multi-dose sachets finish, the machine must be refilled by the home care professional or organization. Once the sachets run out, the machine automatically sends an alert to the home care professional, reminding him or her that the machine must be refilled. In addition, healthcare professionals are responsible for solving some other specific situations related to the medication. For instance, if the doctor changes the patient's prescription (added or reduced number of pills), the caregiver must take the sachets out of the automatic dispenser, make a small cut in the needed sachets in order to be able to put or take specific pills and place tape to cover the sachets' damage. The tape should not cover the text marked in the sachet, so that afterwards the machine can read it and emit the doses of medicine in the right doses at the right time. Therefore, the next step is to place again the sachets into the machine.

As noted, with the introduction of this new technology, the home care professionals or organizations experienced changes in responsibilities. For the service to be delivery successfully, it is crucial that these entities understand their new responsibilities and perform them properly. For this purpose, appropriate training material for home care professionals regarding the machine is of high importance.

## **5.4 Benefits of the medicine dispenser**

As mentioned, the medicine dispenser is sold by the Finnish company manufacturer to home care organizations. Then, the healthcare professionals working in the organizations, such as nurses, are the responsible for delivering the service to the patients (elderly).

The medicine dispenser brings different benefits for the users, such as the home care organization, the healthcare professionals and the patients. The information regarding the benefits for the different parties were obtained in the company website (Figure 37).

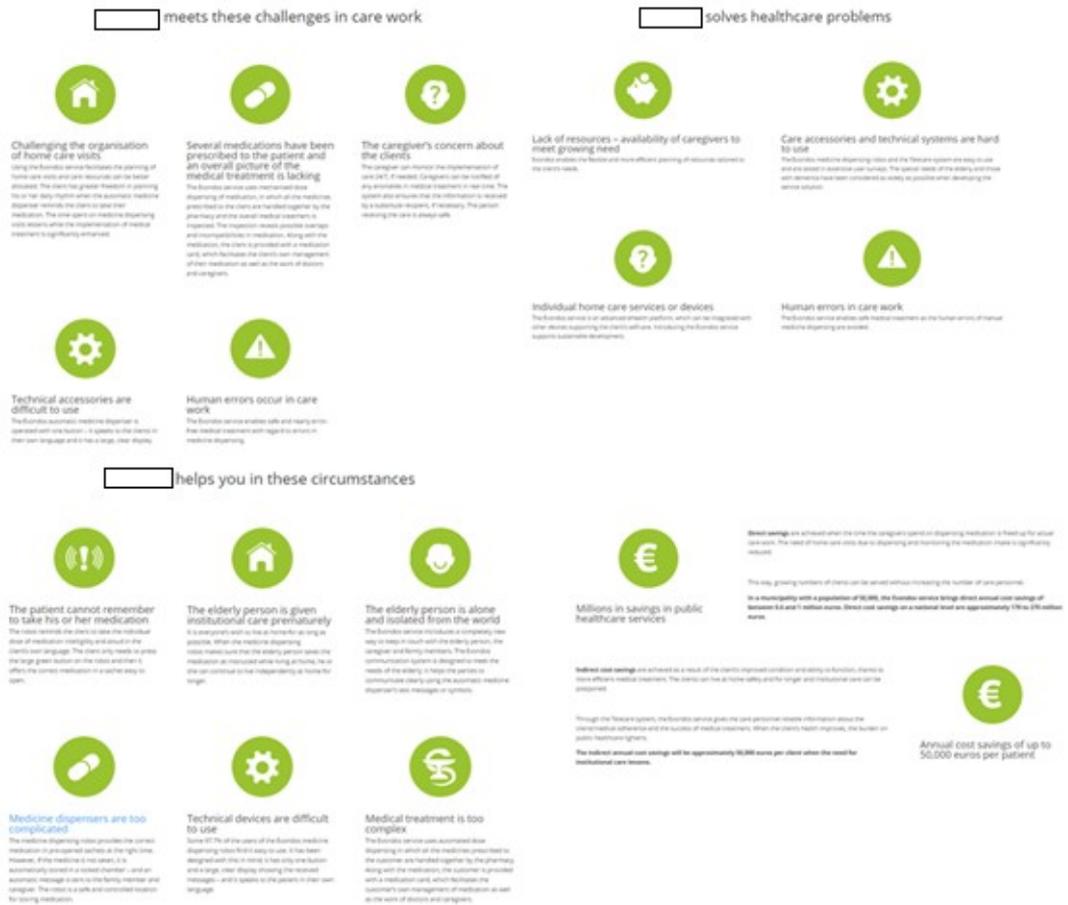


Figure 37. Benefits of the service, from company website.

As observed, the medicine dispenser brings many benefits for different parties. However, the information is not well organized. Since the benefits must be communicated differently according to the targeted user, it is beneficial to comprehend the benefits for each party. Table 4 presents the benefits in a more organized form, by specifying the benefits for each party.

Table 4. Medicine dispenser's benefits depending on the user.

Medicine dispenser's benefits		
Home care organization	Healthcare professionals	Patients
		
<p>→ Better allocation of care resources. </p>	<p>→ Better allocation of care resources. </p>	<p>→ Receiving healthcare 24/ 7 if needed. </p>

→ Direct Savings. €	→ Planning of home care visits. 📅	→ Higher independence. 👤
→ Indirect cost savings. €	→ Monitoring 24/ 7 if needed. 📺	→ Easy to use. 🖱️
→ Safe and almost error-free care treatment regarding medicine dispensing. 🟩		

Home care organizations can first, have better allocation of resources, since healthcare professionals can now work on different demanded tasks. In other words, the healthcare professionals can use the time spent on dispensing medication for actual care work. Second, home care organizations also benefit from direct savings. This is, with the higher number of patients, the home care organizations do not have the need to increase the number of healthcare professionals. In practice, according to the company's website, with a population of 50000, the medicine dispenser brings direct annual savings of between 0,6 and 1 million. Third, indirect cost savings, since institutional care can be postponed. In other words, the elderly can stay in their homes rather than going to a retirement institution, which are covered by home care organizations. In addition, Nyuppieva (2015) identified the factors affecting the economic benefits:

- The larger the distance between the final users' homes, the more savings a customer gets when the number of visits is reduced; the savings include commuting time of the healthcare professionals and transportation costs.
- To give a medicine to a patient, the nurse must have a specific qualification (registered nurse). With the medicine dispenser, the nurse solely has to fill the robot with pre-packed sachets of medicines, and therefore, a practical nurse is enough to perform the service. Therefore, higher qualified nurses can work in other fundamental activities.
- The costs savings and payback period can of course vary, depending on the country the service is provided. Each country has different salary levels of the employees and other related costs.

Healthcare professionals also benefit from the use of the medicine dispenser. First, even if the healthcare professional is busy, the dispenser ensures that the patient receives the right medication at the right time in the right dose. Therefore, the healthcare professionals can be freer to perform other required tasks. Second, the medicine dispenser simplifies the planning of homecare visits. Third, as previously explained, the healthcare professional can monitor the patient whenever necessary without the need of being present.

Patients also benefit from various advantages. First, as the healthcare professionals can give assistance 24/7, the patients can receive the assistance 24/7 in case of need. Second,

the elderly can feel more independence. Since the machine ensures the patient receives the right medication at the right time in the right dose, there is no need for the healthcare to visit the patient as many times as without the machine. Therefore, the patient can do his or her own life without having to wait at home for the healthcare to deliver the medication. As commented by one nurse:

*“Patients do not like us coming to their homes; they value independence very highly. They like the robot because it gives them the feeling that they are in control of their daily medicine intake.”*

With regards to a more independent life, the patient can live longer in his or her home, rather than going to institutional care. Third, the machine is very easy to use for elderlies; it consists of one large machine with only one big button and a large display, in which the messages are shown. Additionally, the machine communicates with the patient in his or her own language.

Finally, all the parties benefit from the fact that the machine is safe and avoids human errors regarding medicine dispensing. The home care organization can increase its performance in the industry, the healthcare professionals become more efficient, and the patients feel safer regarding manual errors that may occur when giving the medication (overdosing, insufficient dose or wrong pills).

Despite all the benefits, the company is struggling to penetrate the market with this revolutionary technology. The reason behind might be related to the fact that the company is not being able to communicate the benefits, and the healthcare professionals are reluctant to its implementation.

## 6. TRAINING MATERIAL OF THE CASE COMPANY

### 6.1 Current training material

So far, the referred company did not invest much in training material for healthcare professionals. The existing training material includes brochures to the different users, short videos regarding the introduction of the service and personal experiences with the robot, some general instructions on the company's website, instructions of how to refill the medicine dispenser and a "demo software" for demonstrating the machine functions in training sessions, programmed by the manufacturer. In addition, as previously pointed out, the website also refers the benefits for the different parties.

First, the brochures are targeted to end users, their relatives and nurses. The end users include the elderly using the medicine dispenser. For these group of users, the message relies on the independent life they will be able to have when using the robot. Figure 38 and 39 present the brochure for end users.

BROCHURE FOR END-USER

Hi, I'm [redacted],  
your new friend

Quality of life, independence and the ability to live in your own home for as long as possible. These are what most of us hope for our old age. This is what [redacted] offers you.

Taking medicines according to the doctor's prescription improves wellbeing, helps you to remain functional and independent. Our service is aiming at just that: ensuring that you receive the right medicine and the right dosage at the right time.

Our [redacted] medicine dispensing robot is well liked by its users and considered a trusted companion, a loyal friend monitoring your wellbeing. And that it truly is as it notifies either your family or the organisation that delivers your care should you for some reason not take the medication in time. It also has a messaging feature for you to receive nice written messages from your carers or relatives.

Your wellbeing is what counts. [redacted] has been developed for your convenience.

“The [redacted] robot tells me loud and clear when it's time to take the medicine. The [redacted] robot has become a trusted companion.”  
Onoffi, 80

Independent  
life at home

Quality of life and Security [redacted]

EASY TO USE AND TRUSTWORTHY. According to the clinical trial, 92.7% of the users found the robot easy to use. It's trustworthy as always gives the medicines at the right time, just as doctor has prescribed. Remembering to take the medicines causes no worries anymore.

Figure 38. Brochure for end-user.

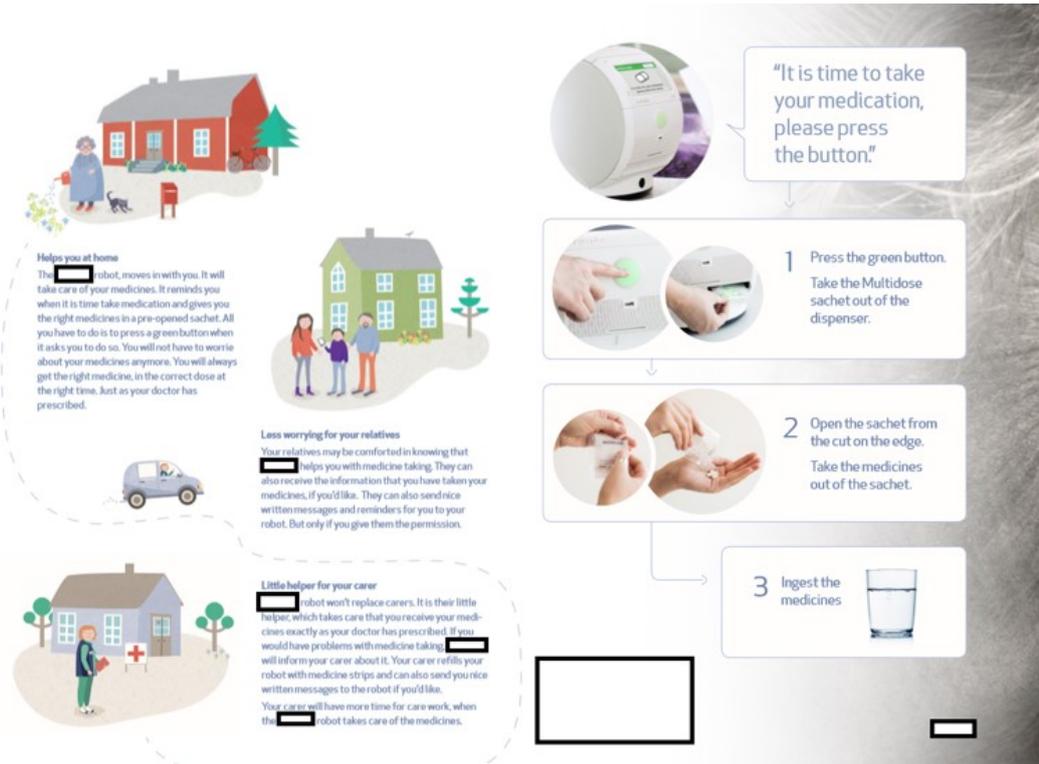


Figure 39. Brochure for end-user.

As shown in the figure above, the brochure shows the benefits to the patients and explains them how to work with the medicine dispenser. For the relatives, the brochures present a different message (Figure 40 and 41).



Figure 40. Brochure for relatives.



Figure 41. Brochure for relatives.

As seen, from the figures above, the value proposition is communicated differently to different parties. Lastly, the brochures for nurses (Figure 42 and 43) show some of the benefits for nurses and some small explanations regarding their responsibilities. In addition, there is also small place for Frequented Asked Questions (FAQ).

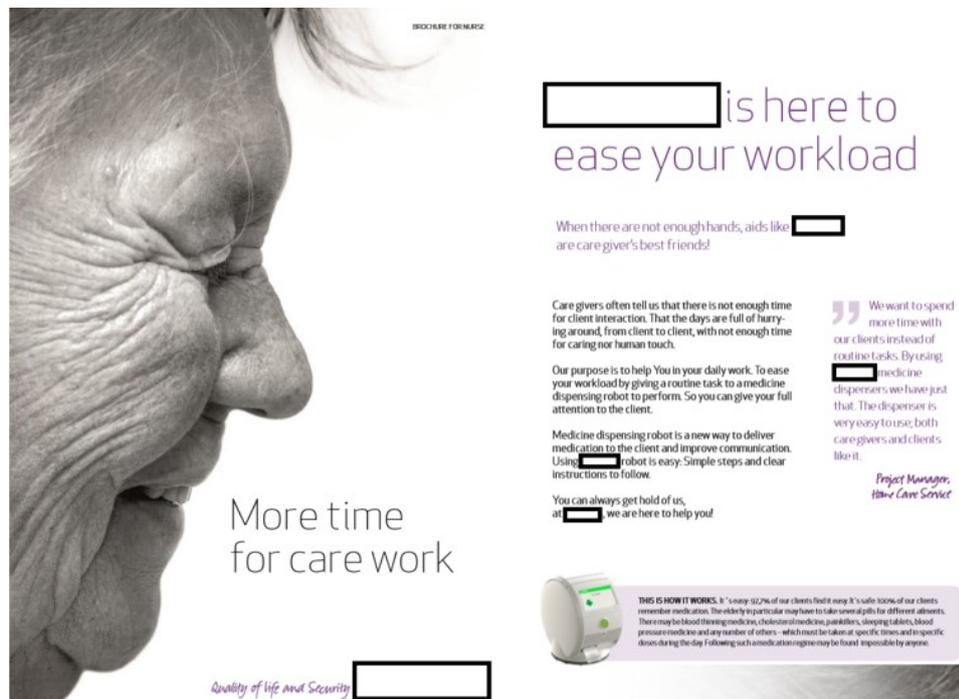


Figure 42. Brochure for nurse

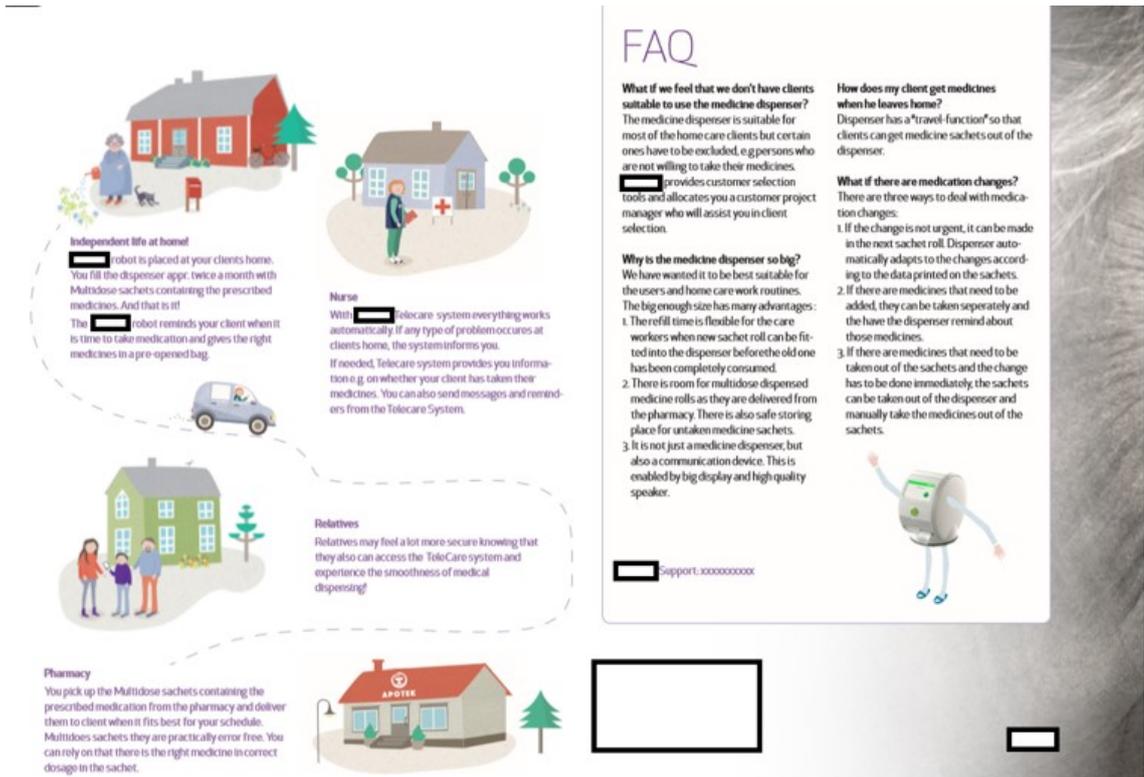


Figure 43. Brochure for nurse

As seen, in the brochure for nurses the company emphasizes the more time for care work, so that caregivers understand that they are still needed even with the introduction of the robot. As observed, the brochures communicate different benefits for the different targeted users.

Second, there are four videos which contain information regarding the machine and its basic features, this is, how the patients should interact with the machine. However, it does not present the tasks the healthcare professional would have to perform and how to perform them to keep the machine working. Figure 44 is a screenshot of the company's videos.

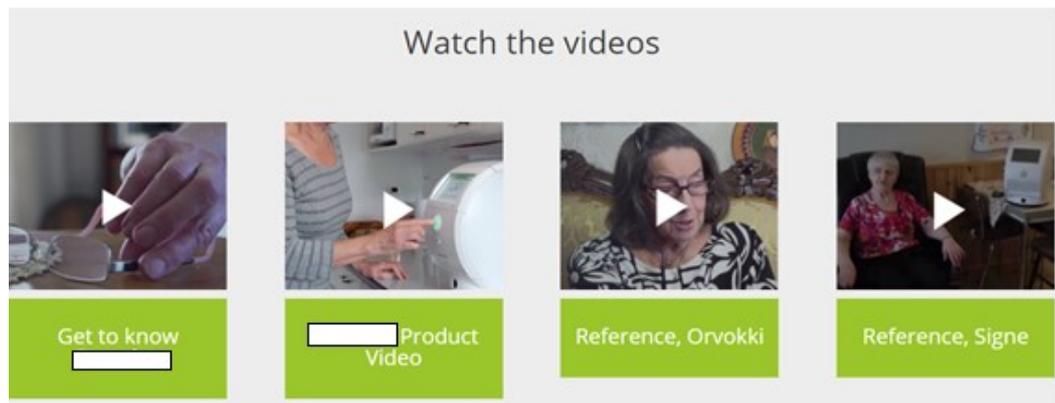
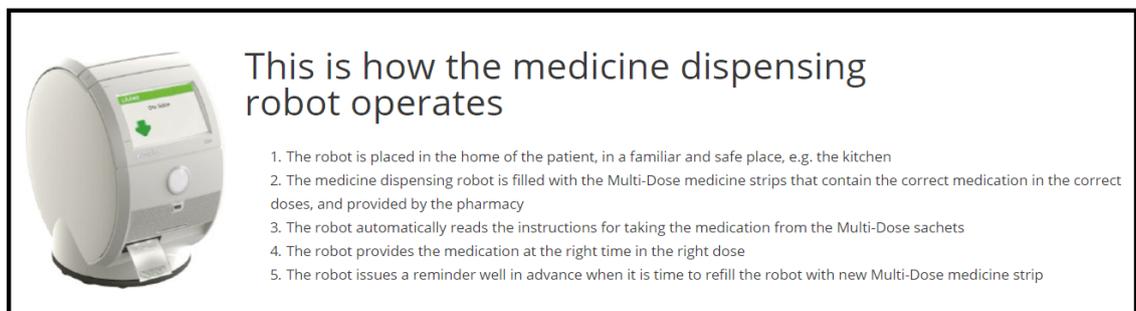


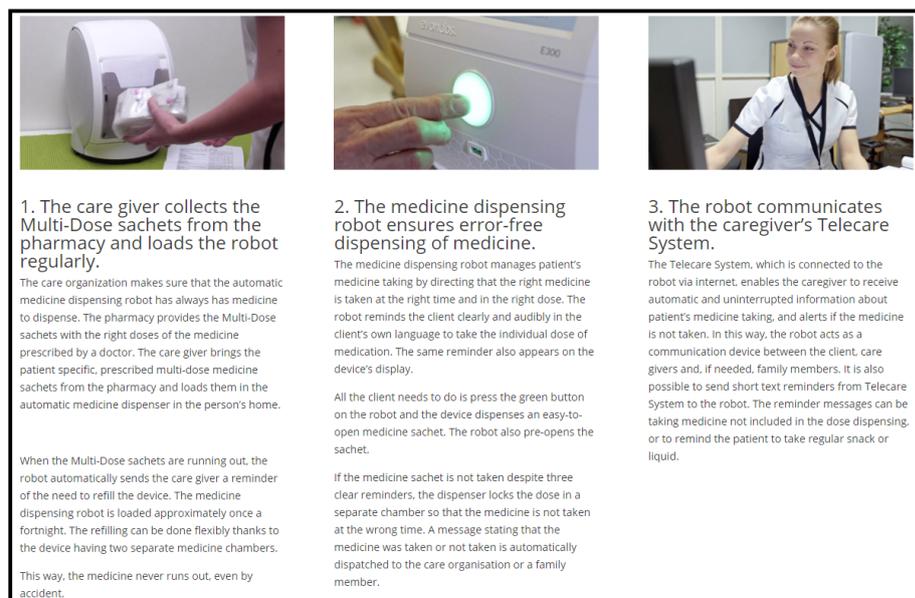
Figure 44. Company's videos (company's website).

The first video starts by explaining how patients should interact with the machine, followed by the benefits for all the parties, i.e. patients, healthcare professionals and home care organizations. Besides, the video contains public information regarding the financial savings for home care organizations. Finally, the production plant is presented. As noticed, there is no information targeted to healthcare professionals regarding their tasks when implementing the automatic medicine dispenser. However, they are the ones who most interact with the machine and the telecare system. The second video is more detailed, and contains more information regarding how the healthcare professionals should work with the machine. Still, there are many features of the medicine dispenser and information missing. The last two videos reveal the personal experience of elderly towards the use of the machine.

Third, the company website contains general instructions about the machine functioning. The instructions are illustrated in Figure 45 and 46.



**Figure 45. Medicine dispensing functioning (company's website).**



**Figure 46. Instructions regarding the medicine dispenser functioning (company's website).**

The instructions in Figure 45 mention the need to fill the machine with the multi-dose medicine sachets, but do not explain how it should be done. As observed, the instructions are quite general and do not refer to the telecare system in detail. Figure 46 shows more detailed information than Figure 45 and refer to the telecare system and the multi-dose sachets, however, when compared to the various tasks of the healthcare professionals, the instructions are quite limited.

Fourth, the company invested in training material with instructions regarding the machine refilling. Figure 47 shows the instructions sheet.



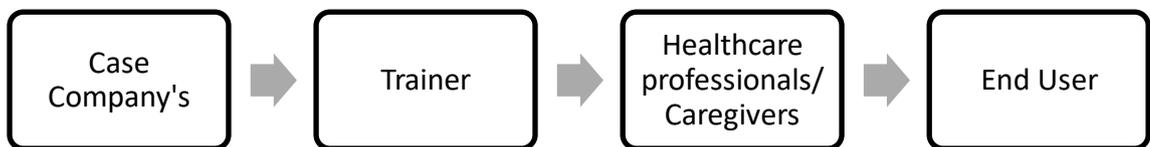
**Figure 47. Instructions sheet of how to refill the medicine dispensing robot**

As noticed, the instructions are quite detailed, and explain how healthcare professionals are supposed to refill the dispenser step-by-step. However, according to the COO of the company, the main message from the instructions sheet is the reference to the customer support. In other words, if the caregiver finds some problem when refilling the machine, he or she should call, and the company will provide all the required information by voice call. This way, the company ensures that the caregiver was successful refilling the machine.

Finally, the “demo software” is used to demonstrate or preview how the machine would work in real life situations. Thus, the healthcare professionals may attend a training session and learn the basic features of the machine. During a company’s visit, it was also acquired that the company provides some FAQ questions to healthcare professionals, however that section is quite limited.

## 6.2 Current training sessions

According to the COO of the case company, the training is provided in the following way: firstly, a trainer belonging to the home care organization is instructed by a trainer from the case company how to work with the machine; afterwards, the trainer is supposed to teach the healthcare professionals or caregivers. Lastly, the caregiver provides the service to the patient. Figure 48 represents the delivery of training.

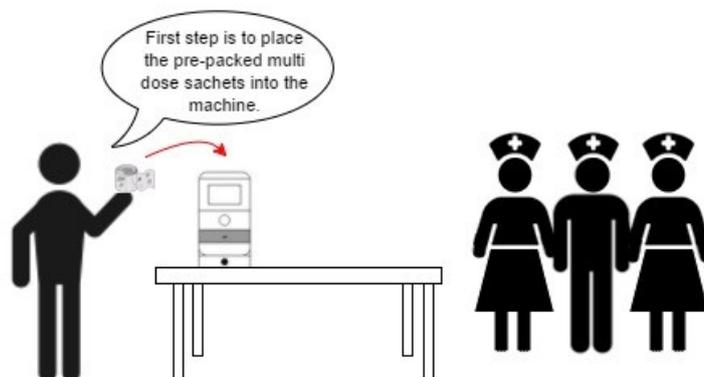


*Figure 48. Training delivery system.*

The case company provides a one-day time training per trainer. Later, the trainer instructs the healthcare professionals, who will provide the service to the patient or end user. In this figure, home care organization is responsible for the selection of a caregiver trainer who can train the other caregivers afterwards. According to the COO:

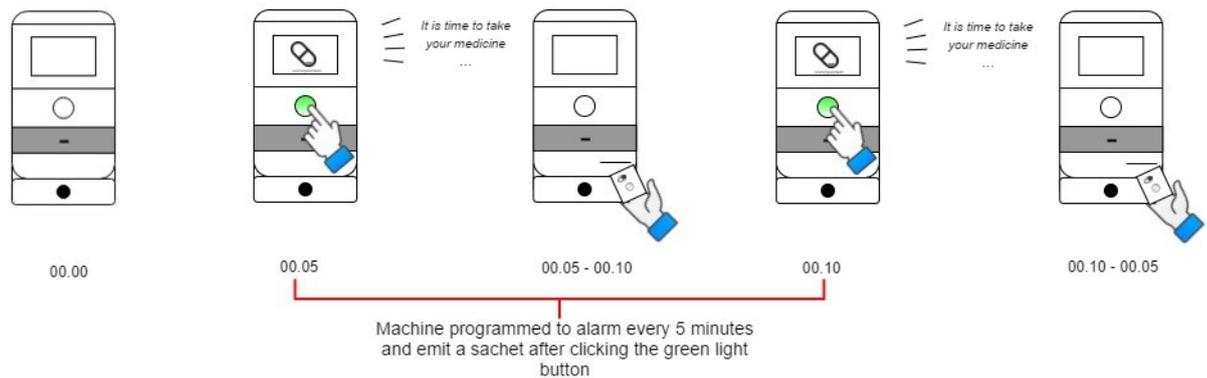
“Everybody using our service needs to have the training. Since there are new nurses constantly entering the organization, it does not make sense to have always a trainer belonging to the company to go to teach all the caregivers”

Figure 49 demonstrates the current training sessions from the trainer to the healthcare professionals.



*Figure 49. Current training sessions.*

As seen in the figure above, during the training session, the first step is to place the pre-packed multi dose sachets into the machine. Afterwards, the machine behavior is exemplified through the referred demo software. This is, the machine does not read the code of the sachet of pills, instead the machine uses the demo software which is programmed in a way that the automatic machine dispenses one sachet of medicines every five minutes. This way, the healthcare professional can understand how the machine behaves at the moment of taking the medication, and how he or she is supposed to interact with the machine in order to get the medication. Figure 50 illustrates the main idea behind the software used in the machine during the training sessions.



**Figure 50. Current demo software.**

As seen in the figure above, the software is quite simple and does not include special situations in which the healthcare professional would have to take responsibility of. Three special occasions are identified below.

- Green light button is pressed but medication is not collected
- Green light button is not pressed
- Two sachets are emitted at the same time

First, if the green light button is pressed at the time to take the medication, but the patient does not collect the emitted sachet, after some time, the sachet is placed into the locker, and the caregiver is the responsible for opening the machine and giving the medication to the patient (Figure 35, option 1). Second, as previously mentioned, if the green light button is not pressed by the patient, the machine will cut the supposed sachet of pills and place it into the locker, inside the machine (Figure 35, option 2). Finally, it is possible that a patient needs to take two doses of medicines at the same time. Thus, the machine will emit two sachets of bags at once. With the current demo software, the healthcare professional does not learn how to proceed in the mentioned situations and might not be aware of these possibilities.

Moreover, the company training” demo software” does not instruct healthcare professionals to:

- Work with the telecare's system
- Other details regarding the interaction with the dispenser.

### 6.3 Issues related to the current training material

As realized, the current training material includes videos mostly targeted to end users. The videos regarding personal experience of users are targeted to users. Therefore, the healthcare professionals cannot recognize the benefits of the machine for them. Since the caregivers influence the patients' machine acceptance, it is fundamental for healthcare professionals to understand the involved benefits. In other words, healthcare professionals who accept and desire the machine, will communicate in a proper way the benefits for the patients. Since the patients tend to trust the healthcare professional, the training material should be targeted to healthcare professionals rather than end users. During a brainstorming session in company's site, the COO discussed the following issue:

*“We had some cases in which caregivers went to patient homes and said: ‘Here is a robot, and this will replace me. Do you want me to come or do you want this one?’ It is really a challenge, because caregiver’s opinion directly affects the patient’s opinion.”*

A poor attitude from caregivers will result in rejection of the machine from the patients. Therefore, the discussion continued as follow:

*“How can we tell the care givers, who still are the trusted ones for the patients, that they are so well convinced about the value that they are able to sell the idea of taking this robot into use for the end user?”*

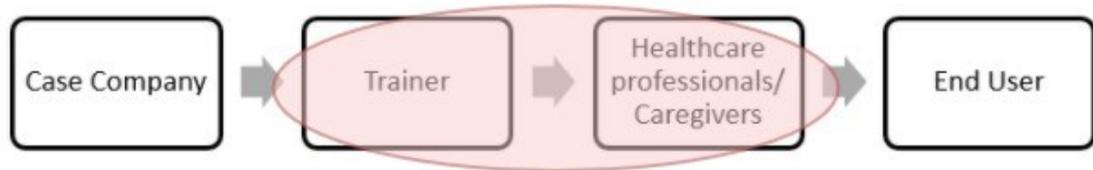
There are as well other issues involved with the communication of the value to healthcare professionals. As mentioned, the company's website misses fundamental information for the users regarding the medicine dispenser.

In addition, the brochures show the benefits and responsibilities of all users. They include explanations of the main responsibilities of caregivers as well, however, the medicine dispenser's features and functioning is still missing. Consequently, there is lack of understanding and therefore, rejection of the robot.

Moreover, the instructions in the website are quite general and do not instruct users how to use the telecare system. The “demo software” is also quite simple and does not include special situations probable to happen in a real scenario. Therefore, the healthcare professionals do not comprehend which are his or her actually responsibilities.

## 6.4 Issues related to the current training sessions

After a brainstorming session in company site, issues related to the training sessions were identified. The issues were mostly related to the interaction between trainer and caregiver rather than caregiver and end users (Figure 51).



*Figure 51. Identified area of issues related to training.*

As observed, the issues related to training are concentrated in the red area in the figure above. This is, between trainer and healthcare professionals. The issues are identified below.

- Very restricted time of trainers
- Very restricted time to practice
- Care organization does not take training seriously
- Use of the training is not continuous

First, as mentioned, time for training the healthcare professionals is quite limited. Therefore, it is challenging to communicate all the required information in such a limited time to the care givers. According to the COO of the case company, refilling the robot is one of the most important responsibilities for healthcare professionals. Therefore, it is mandatory to go through this step during the training sessions. Since, the training only takes about 30 minutes, there is no time to learn all the features of the machine.

Second, the healthcare professionals have restricted time to train and practice with the medicine dispenser. The training targeted to healthcare professionals take about thirty minutes, which does not allow caregivers to learn all the features of the robot.

Third, the care organization does not take the training seriously. Therefore, healthcare professionals do not really learn how to work with the machine. One way to solve this issue would be the inclusion of a trainer who is part of the team; in other words, a technology oriented trainer but closer to the nurses.

Finally, the training does not happen in a continuous basis. Consequently, the healthcare professionals tend to forget the features and different situations that may occur with the medicine dispenser.

In addition, the structure of the training sessions starts by informing the healthcare professional about his or her responsibilities rather with communicating the features and

benefits of the machine. As when selling a car, the sales man does not start by instructing the customer how to fill the tank, the training sessions should not start by instructing the healthcare professional to fill the machine with the pre-packed sachets of medicines. Instead, what is expected from the user should only come in the end of the training session (Karthik, 2012).

## 7. PROPOSED TRAINING MATERIAL

### 7.1 Developing the training material – Step 1

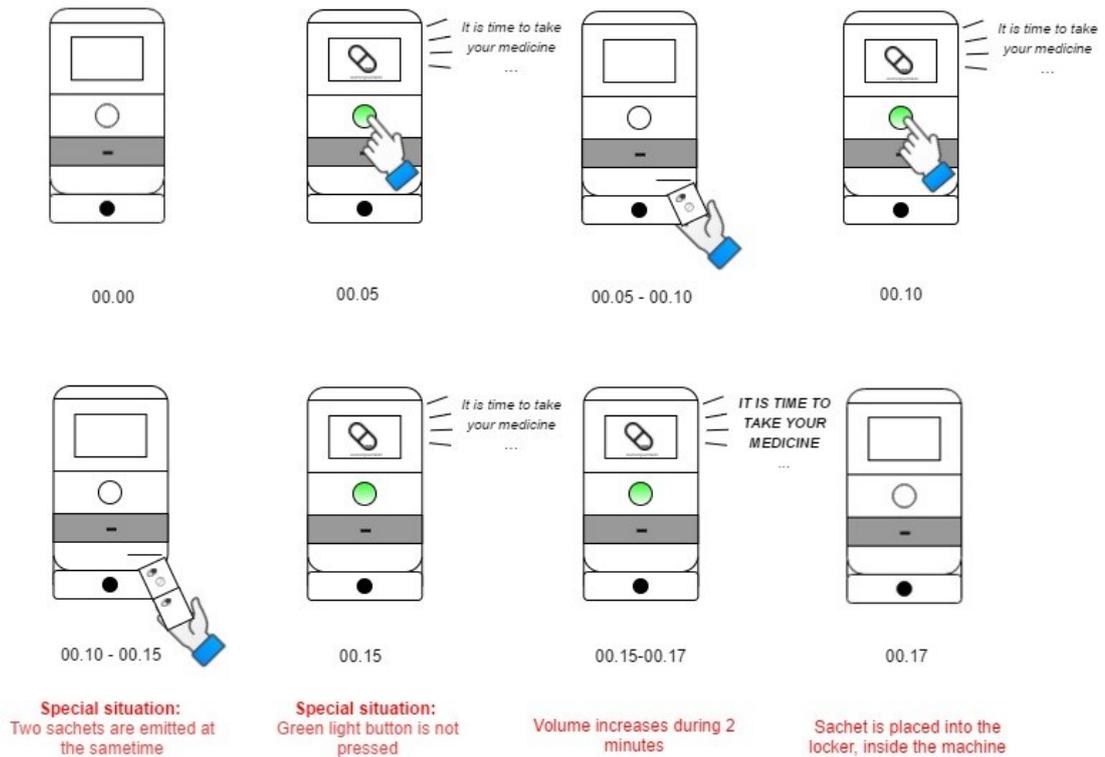
As previously pointed out, with the automatic medicine dispenser, the healthcare professionals notice changes in responsibilities. In order to obtain the expected result of the machine, it is crucial that the healthcare professionals have knowledge regarding the machine and its advantages. Besides, once there is a deep understanding on their new responsibilities and on the machine functions, the healthcare professionals will be more willing to purchase the machine. Therefore, proposed training material that can communicate the value of the machine elegantly, is presented further. With the development of improved and appropriate training material, wrong pre-assumptions of healthcare professionals can be prevented.

The proposed training session would start as illustrated in Figure 52. As mentioned in section 4.1, instructions should tell the trainee what is expected from him only at the end of the training program (Karthik, 2012). Therefore, instead of starting by placing the pre-packed multi dose sachets into the machine (role of the healthcare professional) as in the current training sessions, the instructor must initiate the session by communicating the value of the machine.



*Figure 52. Proposed training sessions.*

Afterwards, a new proposed demo software is run. The demo software would comprise the already mentioned special occasions. Figure 53 presents the idea behind the proposed demo software.

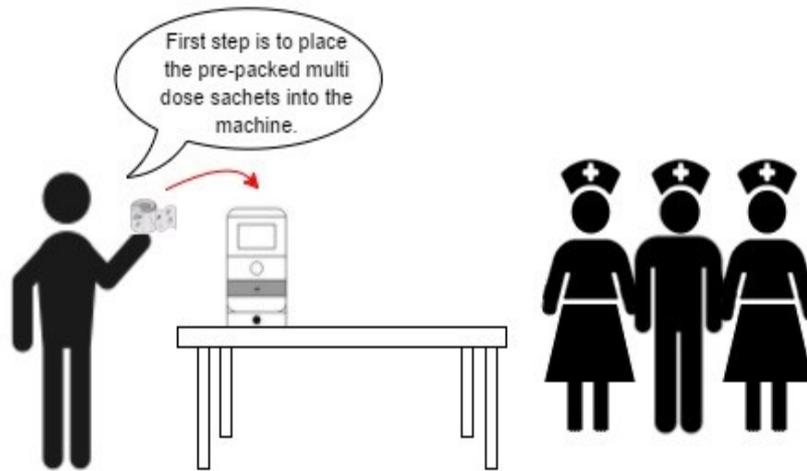


**Figure 53. Proposed demo software.**

The proposed software would still emit a sachet of pills every five minutes, as the current one. However, it would include the special situations mentioned above. As seen in the figure above, at the minute ten, the healthcare professional is supposed to press the green light button. Afterwards, instead of one sachet of pills, two sachets would be emitted. At the minute fifteen, the healthcare professional should not press the green light button in order to be able to understand the behavior of the machine in that particular case. In the following minutes, the volume of the machine increases and after two minutes, the machine itself cuts the sachet of pills and place it into the locker. Posteriorly, the healthcare professional is supposed to manually remove the sachet from the locker and give the medication to the patient. During the training session, it is important to mention that pressing the green light button but not collecting the sachet of pills will result in same machine behavior, i.e. if the sachet is emitted but not collected, the machine will increase volume until is collected. In case it is not taken, the sachet will be placed into the locker, and the healthcare professional should manually remove the sachet from the locker and give it to the patient.

The proposed software would perhaps require a software developer, since the manufacturer may not have the skills to develop a more complex code for the software. However, the investment in the software would facilitate the user adaptability to the machine, hence increasing the diffusion of the technology and, consequently, its sales. Since the healthcare professional can get a deeper understanding on the different functions of the machine, the willingness to buy it also increases.

Lastly, the training session would end with practicalities regarding the machine functioning. For instance, instructing the healthcare professionals how to place the pre-packed multi dose sachets into the machine, as shown in Figure 54.



*Figure 54. End of the training session.*

As mentioned by Karthik (2012), in training, the instructor only tells what is expected from the audience at the end of the session. This leads to more acceptance regarding the machine.

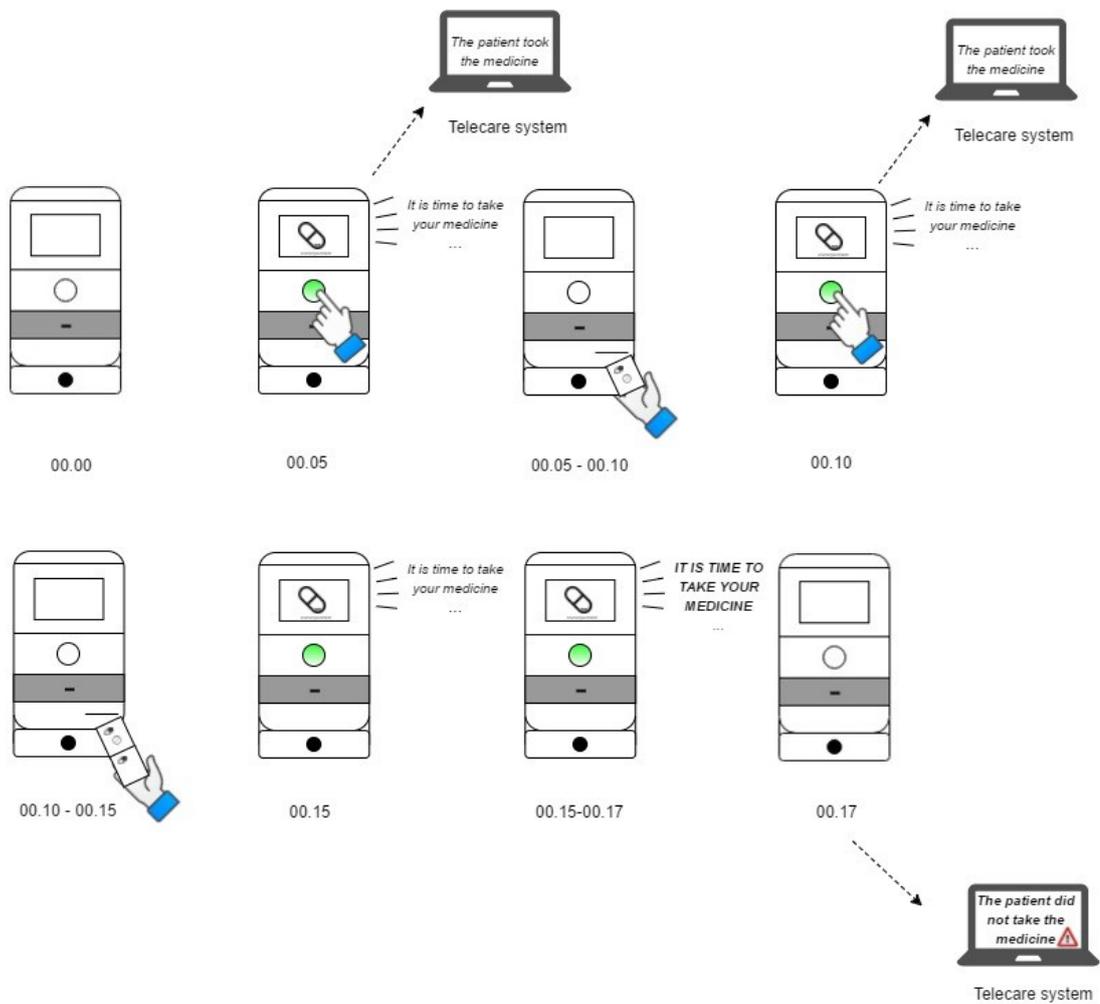
## 7.2 Developing the training material – Step 2

The next step involving training material would include the telecare system. This element plays a fundamental role, since it is through the telecare's system that the healthcare professionals have access to all the patients' information and communicate with the patients. Therefore, linking the new software with the computer through the telecare system would be the next investment step on the company's training material. Figure 55 demonstrates how the proposed training sessions would occur.



*Figure 55. Proposed training sessions.*

Figure above shows how the new training sessions would start. First step would be to get the attention of the healthcare professionals by showing the machine, mentioning its benefits for the audience and explaining its purpose. In addition, the computer would be placed on the table, so that the healthcare professionals can understand not only the machine behavior, but how to interact with both technologies needed for the system to be delivered effectively. Figure 56 presents the software that would then be used in the proposed training sessions.



**Figure 56. Proposed demo software linked to the telecare system.**

Including the telecare system when demonstrating the machine functions, may trigger a clearer understanding for the healthcare professionals who probably have only small experience regarding computer systems. The proposed training material would embrace the same demo software explained in Figure 53, but with the inclusion of the telecare system. This way, healthcare professionals can comprehend the behavior of the machine and computer when the patient takes and does not take the medication. After running the “demo software”, healthcare professionals may try themselves the machine and learn its details (e.g. how to fill the machine with the pre-packed multi dose sachets).

As in previous step for development of training material, the session must end with the practicalities regarding the functioning of the machine and what is expected from the audience. Figure 57 illustrates the end of the training session at this stage.



*Figure 57. End of the training session.*

As observed in figure above, the end of the session follows the same logic as in step 1 of training material development. The difference here is the presence of the laptop while explaining the machine functioning. This way, the instructor can always explain other features regarding the telecare system and its link with the medicine dispenser.

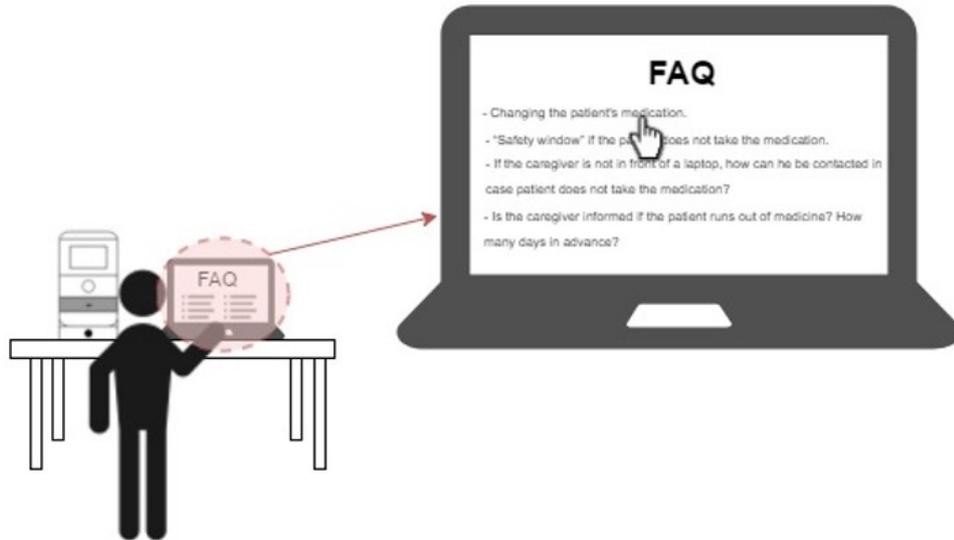
### 7.3 Developing the training material – Step 3

As suggested above, with the current training material, healthcare professionals are not instructed about other details regarding the interaction with the dispenser. Thus, the next step in training material would be to clarify them regarding questions that may emerge even before they could think about them. For that purpose, Frequent Asked Questions (FAQ) would be shown in the laptop after running the “demo software”. This way, the acceptance of the machine is easier. Figure 58 shows an example of a training session when FAQ are included in the training material.



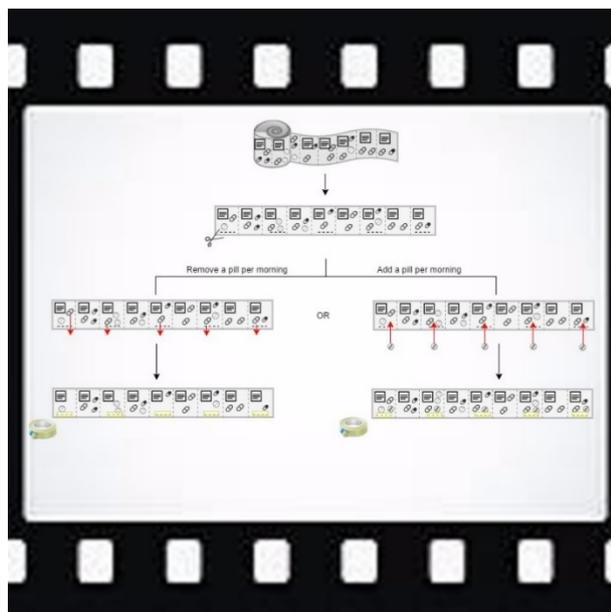
*Figure 58. FAQ example.*

In the figure above, the healthcare professional questioned the sales person about medication changes. In the purpose training session, the sales person must open the FAQ link regarding the topic, as shown in Figure 59, in order to answer questions that may emerge.



**Figure 59. Frequent Asked Questions.**

Afterwards, an explanation regarding the chosen topic is shown in the display of the laptop. In the referred example, when opening the link, a video with a procedure of opening a sachet and adding or removing a pill is then shown to the healthcare professionals (Figure 60).



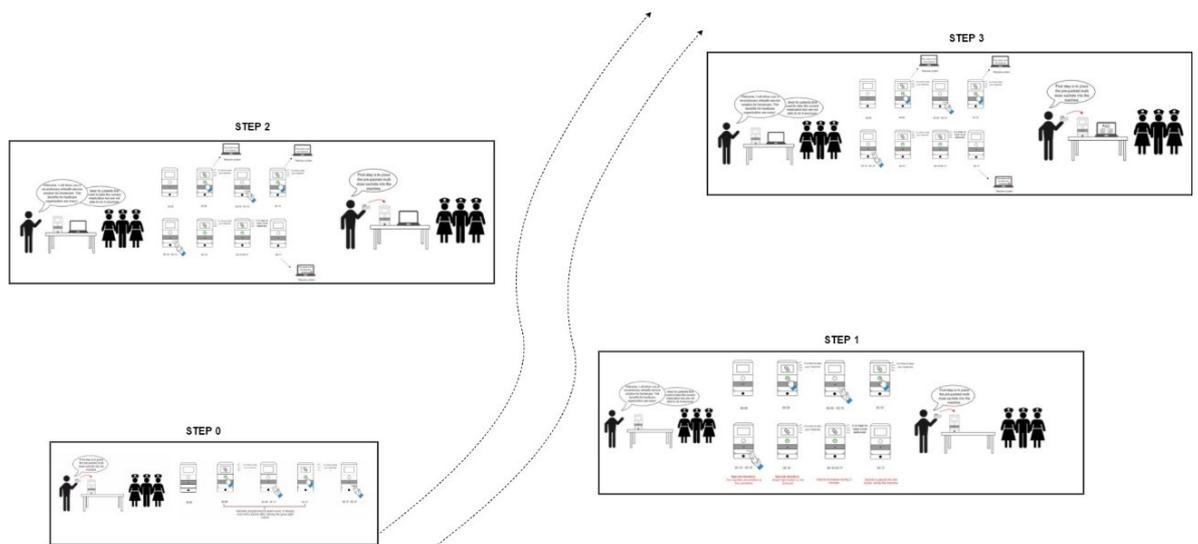
**Figure 60. FAQ - Manual process of opening and removing or adding a pill per sachet.**

As seen in figure above, only one pill is added or removed each two sachets. If a particular patient needs medication every morning and night, it means that every “morning medication” was altered. The figure above exemplifies the case in which the healthcare professional only has to add or remove a pill each morning. However, each patient is a particular case.

In order to add or remove a pill per sachet, the healthcare professional must firstly, unroll the pre-packed multi dose sachets and make a small cut with a scissor in the sachets. Secondly, according to the doctor’s prescription, the healthcare professional should remove or add a pill to the specified sachets. Lastly, tape must be placed into each slot in the sachets. During the process, the healthcare professional has to be careful when cutting or placing tape into each sachet since the text marked in the sachet must be readable for the machine. Moreover, it is important to recognise whether it is more profitable to go through that procedure or to use the traditional medicine dispenser for each particular situation (depending on the number of medication to be altered).

#### 7.4 Road Map for the Investment in Training Material

As presented, the development of training material comprises distinct phases. In the beginning of the product life cycle, the training material consists of a change in structure of training sessions, and an improvement on the current “demo software” which will include special situations. Further, the training sessions will follow the same structure as in the step 1, but the telecare system would be part of the session and linked to the “demo software”. Lastly, FAQ can be added as more standardized training material. As mentioned, the more effort and time spent with the technology, the more standardized the training material should be. Therefore, a proposed road map for the training material of the company is presented in Figure 61.



*Figure 61. Road Map for the company’s training material.*

As observed in the figure above, the step 0 in the road map of the training material represents the current training material of the company. Step 1 would require investment in a new demo software and a change in the presentation of the machine. This is, rather than starting the training session with the further responsibilities of the healthcare professional, the instructor would start by presenting the benefits of the machine. As referred by Karthik (2012), training must inform what is expected from the trainee only at the end of the training programme, explaining the reason why the structure of training was changed since step 1. Step 2 would require investment in linking the medicine dispenser with the telecare system using the same demo software as in step 1. However, in this case the demo software would also comprise the telecare system. The training session would also follow the same structure as in step 1. Finally, step 3 would include FAQ, which could be presented in the end of the session. This thesis proposes a road map for the investment in training material for the Finnish healthcare company, however as the sales increase more opportunities arise for the development of the training material. In other words, part of the profit generated from the sales can be used for investing in training material and therefore generate more sales and increase the market penetration of the medicine dispenser. As previously referred, the training material in the beginning would be more customized; as the market penetration increases, the training material would be more standardized.

## 8. DISCUSSION AND LESSONS LEARNED

### 8.1 Overview of the Problem and Framework

In today's competitive business environment, creating value for the customer and being able to communicate it effectively according to their needs, it is fundamental to succeed when launching a new technology (Ulrich & Brockbank, 2005). Customers are not aware of a new technology at its launch, therefore it is responsibility of the supplier to communicate its functions, features and benefits to the potential customers. Khalifa (2004) stated that customers only buy technologies if they can perceive the value of the offer.

Moreover, Davis (1989) explained the technology purchasing behavior according to two beliefs: perceived usefulness and perceived ease of use. A new technology is unknown for many during the introduction phase; on the other hand, innovators (the ones who adopted the technology in the introduction phase of product life cycle), may not fully understand the technology. For customers to perceive the usefulness of the technology and its ease of use, it is fundamental for the companies to provide training material for customers, which allows the communication of the value, this is, the value proposition.

Training material has been use in business context as a way to instruct internal employees in a firm and therefore, increase their productivity and motivation towards work. This thesis, proposes the use of training material in order to instruct the customer about the new technology, which will lead to customer satisfaction and perception regarding the value proposition, resulting in faster technology diffusion and higher number of adopters.

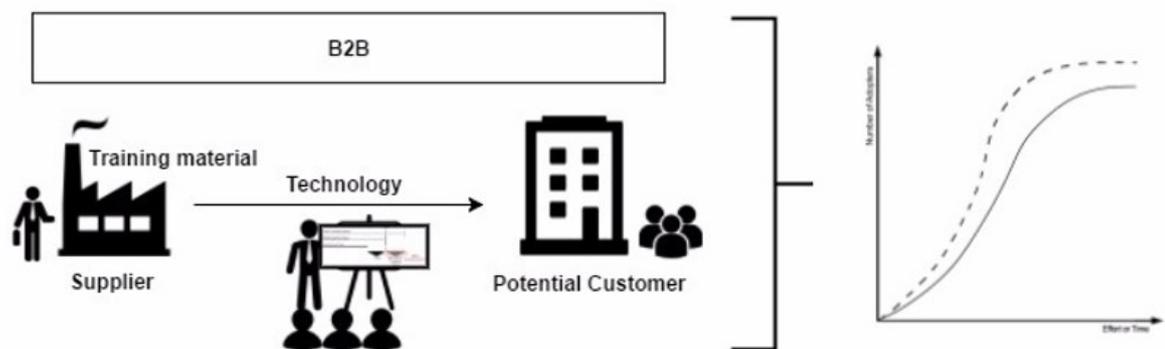
The case company delivers high-tech medicine dispensers to home care organizations, which are used to traditional healthcare methods. According to Herzlinger (2006) innovating in healthcare is extremely hard, mostly due to the difficulty of using the technology. In addition, healthcare specialists tend to blame the technology for the high costs in the sector.

The medicine dispenser offered by the case company is a revolutionary system which is supposed to reduce the costs for home care organizations. Typically, the machine is sold to home care organizations, which seem quite supportive in the implementation of the machine.

Despite the acceptance of home care organizations, the technology is having difficulties in penetrating the market. This happens due to the fact that the users of the machine are the healthcare professionals, such as nurses, and the patients, such as elderlies (as end customers). Nurses and other healthcare professionals are worried regarding the implementation of the machine, and therefore they refuse to use it. Consequently, the home care

organizations cannot perceive the value of the technology, leading to higher costs. In other words, if home care organizations invest in a machine that is not being used, there is no sense in buying it. Another problem regarding the machine is the inappropriate choice of patients. Therefore, it can be stated that the customers and healthcare professionals are not being able to perceive the value of the new revolutionary technology. In other words, the target users are not understanding the features, functions and benefits of the new technology.

As introduced in section 6.1, the current training material for customers is very limited and inappropriate for the targeted audience. This thesis suggests the investment in training material to trigger the diffusion of new technology. Figure 62 illustrates the thesis framework.



*Figure 62. Framework of the thesis.*

First, the technology S-curve is introduced in chapter 2 in order to comprehend the market penetration of a new technology. Second, customer perceived value is referred in chapter 3 as something fundamental to make the customer satisfied. Third, to effectively deliver the customer value, training material targeted to customers is introduced in chapter 4. In chapter 5, the connection between the different frameworks is presented.

The case company did not invest much in training material for customers, therefore they are not being able to perceive the value of the new technology. Investment in appropriate training material, would bring many benefits for the company.

## 8.2 Reflection of the Case in Framework

As mentioned, the company has now some videos on the company's website explaining the robot functioning and experiences of elderly with the machine. The positive experiences of the elderly increase the diffusion of the technology among other elderlies. Communicating their experiences is fundamental to capture the attention of the other final users. Nevertheless, during a brainstorming session with company personnel the following thought came up:

*“Can a citizen demand to have personal care? Should he pay more or less in that situation? Do the municipalities need to provide services or personal services? How far do the patients can choose whether to have a robot or personal care?”*

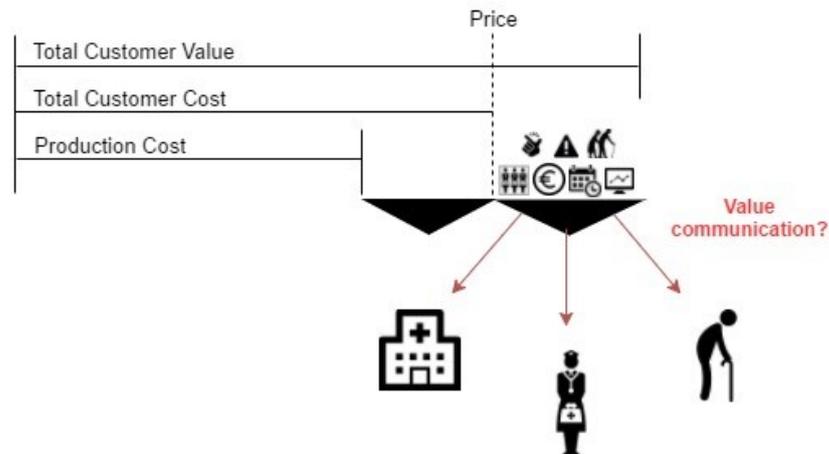
In other words, can the patients refuse to have a robot as home care service? Or the homecare organization should just implement it?

Despite the challenges with the acceptance of end users, as mentioned, the largest challenge is to influence healthcare professionals to adopt the machine. The current training material is simplistic and therefore, healthcare professionals cannot perceive the features, functions and benefits of the machine. Furthermore, as discussed, one of the videos, as well as the company’s website, contain information regarding financial savings. This fact attracts the municipalities and home care organizations to purchase the machine dispenser. Still, healthcare professionals cannot perceive the value of the machine for them.

With 5 nurses per month attending training sessions, it does not seem worth to invest in training material. However, once the technology penetrates the market, the number of adopters will increase, and therefore the number of nurses attending the training sessions would as well increase. Perhaps the company cannot see the need for investment yet since it is easy to teach the user, however as explained previously, it is fundamental for market penetration.

As suggested by Karthik (2012), in order to capture the attention of the healthcare professional, his or her responsibilities towards the machine should be only explained in the end of the session. In addition, the current demo software is very simplistic and the company did not allocate one employee to take care of its design and implementation, because product development employees are needed for developing features of the machine. In other words, company prefers to invest in enlarging the features of the machine rather than in training material, thinking that the sales increase due to increase in features. However, if potential customers neither cannot understand the simple features of the medicine dispenser and machine functioning, it is not worth to develop more complex ones.

The main objective of the proposed training material is to elegantly communicate the value of the technology for each party, mostly for healthcare professionals, who are not being able to perceive the value. Investment in training material for the different parties would positively influence the diffusion of the technology. Figure 63 shows the benefits the different parties could benefit from.



**Figure 63. Perceived value for different parties.**

When observing the figure one issue arises. The main question regards whether the company should target diverse training material for the different parties or not. For instance, since the more challenging target are the healthcare professionals, should they have access to financial information? Open information regarding the savings the machine brings to municipalities and home care organizations can lead to resistance from elderly or healthcare professionals. On the other hand, hiding the financial benefits may generate other issues. The COO of the company made an important statement:

*“Of course, we have to change the way we say it, but we need to be open”*

As understood, the COO agrees with the share of information with all the different users. For instance, caregivers must know the economic benefits of the machine, so they know how to price it for end users. However, he also agrees that the message should be communicated differently. On the other hand, it is important for end users to know the economic benefits for homecare, because it will as well influence the price they pay for the service. As stated by the COO:

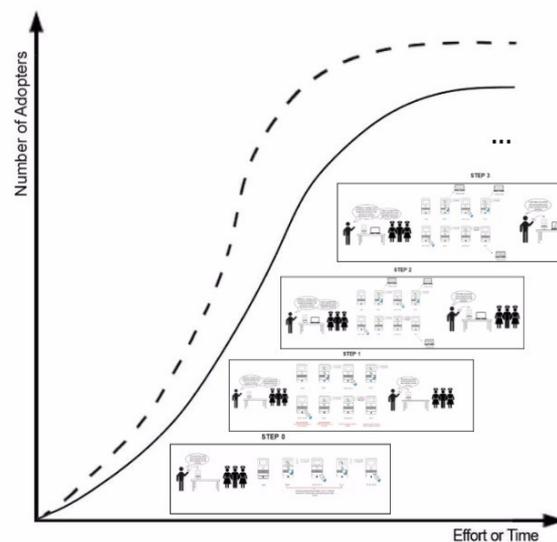
*“The basic message for the end user (besides values as freedom, health and independence) is that since it will be cheaper for the care organization, it will as well be cheaper for the end user”*

It is fundamental to provide all the benefits to the different parties and to be open regarding all the information. However, the way of communicating the values influences how the different users accept the machine, explaining the importance of properly communicating the value proposition of the referred technology.

### **8.3 Analysis of the Case Based on Framework**

The new technology offered by the case company brings many benefits for the different entities: home care organizations, healthcare professionals and patients. However, the

company is not being able to communicate the value of its technology. The healthcare professionals do not understand the functions, features and benefits of the medicine dispenser, and therefore the diffusion of the technology has been occurring at a slow path. The Finnish company manufacturer (supplier) is trying to sell the medicine dispenser (new technology) to the home care organization (customer). However, the healthcare professionals, working for the home care organization are not perceiving the value of the medicine dispenser, making the adoption of the machine quite harsh. Therefore, the technology is not penetrating the market as the Finnish company desires. The investment in different training material, in the diverse phases of the technology lifecycle for the healthcare professionals would highly increase the adopters of the technology and the rapidity of adoption. The proposed road map for the training material would then be invested in the different phases of technology adoption curve, as illustrated in Figure 64.

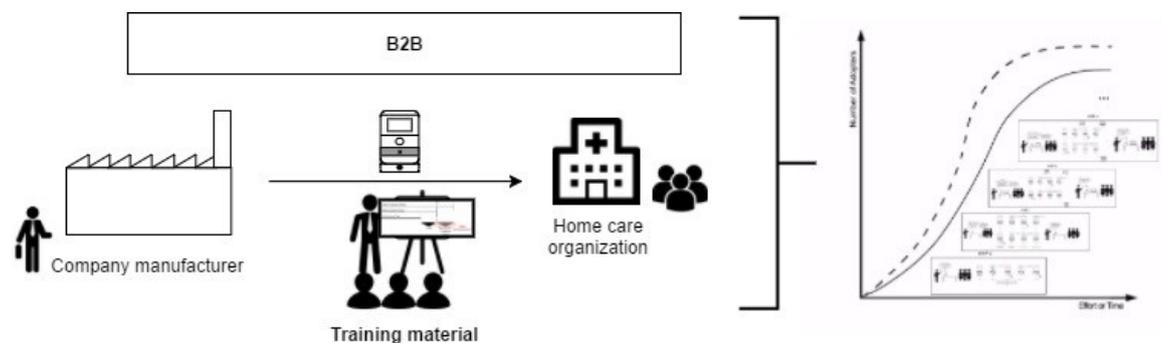


**Figure 64. Proposed road map for investment in training material in the technology adoption curve.**

As observed in the figure above, investing in training material for the case company would increase the penetration of the medicine dispenser in the market. In the introduction phase of the technology, the current training material must be highly customized according to the needs of the healthcare professionals. As the technology penetrates the market, the training material becomes more standardized. As previously stated, the case company does not have means to provide training to each caregiver, since there are new nurses entering constantly in the care organizations. Thus, the training is given by a trainer belonging to the case company to caregivers that further instruct the other caregivers. If the training material is more standardized, the caregivers can solely watch videos or read instructions, removing the intense and long need for training sessions. This is important when the number of caregivers using the machine increases. As observed, step 3 of the

road map includes FAQ and videos, which the healthcare professionals can consult whenever necessary, even without the need of attending a training session.

The figure above provides an example of how the training material could be developed in order to increase the rapidity of market penetration and the number of adopters. However, since the number of adopters will increase (therefore, the curve will achieve higher values in y-axis) the need for more training material might emerge. In conclusion, it is fundamental to constantly study the technology penetration curve, so that the investment in training material is paid off. In other words, the investment on the training material highly depends on the shape of the curve. Figure 65 presents the framework with the practical implementation of the case company.



*Figure 65. Analysis on the case company based on the framework.*

As shown in the figure above, the supplier is now replaced by the company manufacturing the medicine dispenser; and the customer is now the home care organization, which employs the healthcare professionals. Since the healthcare professionals are the target users with more difficulty in perceiving the value of the medicine dispenser, the training material is oriented to them. As observed, with the use of training material, healthcare professionals can finally comprehend the functions, features and benefits of the machine, increasing their acceptance towards the technology. Finally, the technology is able to penetrate the market and afterwards, more standardized material must be developed in order to allow the dispenser to live as longer as possible in the market.

## 8.4 Analysis of the results

After a brainstorming session which took place in the company's site in Salo, the company personnel were quite satisfied regarding the research and development of the training material for caregivers. As noticed, in order to obtain the desired outcome from the training material, some alterations in the training and perspectives must change. First, the training material provided to the company's trainer must be improved, so that the material for caregiver is appropriate. This will lead to satisfied healthcare professionals more motivated with the machine. Consequently, the patients will be as well happy with the service.

The diffusion of the technology will increase and therefore the number of adopters will enhance. As a start-up company that wishes fast growth, it is fundamental for the case company to be able to communicate the value proposition to the potential and existing customers.

On the other hand, since the case company is a start-up, it is natural that many questions regarding how and to who the different benefits must be communicated arise. However, as the COO stated, it is fundamental to provide open information regarding processes, features and benefits.

The investment in training material might not seem worth in the beginning, due to the small number of caregivers using the machine. However, as the number of adopters increase, it becomes fundamental to improve the available training material and develop new one. More videos regarding the processes, a larger database of FAQ, an improved demo software and well-structured training sessions highly influence the diffusion of the innovation of the case company.

As previously stated, more standardized training material allows caregivers to get informed regarding the features, benefits and functions of the robot without investing time in training sessions, explaining its importance. Moreover, it solves also some issues previously stated between the trainer and caregivers. The identified problems were:

- Very restricted time of trainers
- Very restricted time to practice
- Care organization does not take training seriously
- Use of the training is not continuous

First, with the new proposed material, the time of sessions can be reduced or the quality of the session may increase, since the new demo software basically shows almost everything the caregivers need to know regarding the machine functioning. This reduces the time of the discussion, and therefore caregivers can use the training for more practice. In addition, as the training becomes more standardized, such as with the development of FAQ, the caregivers may consult the training material before attending a training session. Since the caregivers are well informed about the machine previously to the training session, it is easier to follow the discussion, and time is better allocated for practice.

Second, as explained above, with better and more standardized training material, the caregivers can use the time of the training sessions for actual practice rather than theoretical explanation. In addition, they can run the new “demo software” and practice the different required tasks.

Third, care organizations do not take the training seriously, probably due to the lack of understanding regarding the machine. When there is a minimal understanding previous

to the sessions, the acceptance towards the machine increases and hence their acceptance towards training becomes more positive.

Finally, more standardized training material and more training material available allows caregivers to review the information whenever needed. Since the training is not continuous, the training material provides an opportunity for caregivers to revise the matters regarding the medicine dispenser any time they want.

## 9. CONCLUSIONS

Due to the harsh competition in the market, companies constantly try to develop technologies that satisfy the needs of the customers. To successfully penetrate the market with a new technology, companies have to be able to communicate the value of their offers according to the target customer's preferences. The same technology can be sold to different groups, but the value proposition must be communicated differently.

The objective of this study was to discuss the investment in training material to increase technology diffusion. The thesis focused on many concepts, such as market acceptance, market penetration, technology diffusion, customer value, value communication, and training material. Additionally, this study suggested a theoretical framework for technology diffusion through the use of training material. Lastly, the case application – development of training material for a medicine dispensing mostly targeted to healthcare professionals, to increase technology diffusion.

The key findings of the thesis were that even though all the parties in the healthcare system have advantages and benefits from the medicine dispenser, there is still resistance to its market acceptance. The main reason behind is related to the lack of ability of the company to communicate the value proposition of the offer. Training material targeted to the different users can lead to both faster and more extensive diffusion of the technology. In addition, the more the time and effort applied on the technology, the more standardized the training material should be. On one hand, because with the growth of adopters, there is no possibility to provide customized solutions for each of them. On the other hand, because through the diffusion of the technology, individuals start to get to know the technology from each other, and therefore only details are needed to be provided (from standardized training material).

Innovating in healthcare is challenging, and therefore, training material targeted to users can be a powerful tool for penetrating the market. Usually, customers perceive the value of a technology depending on its usefulness and ease of use. Therefore, it is fundamental to provide tools for customers to facilitate their interaction with the technology. Communicating its usefulness and providing tools that help customers, increase the acceptance towards a technology. Consequently, technology diffusion is faster and more extensive. This study provided a road map for the development of the training material for a Finnish company performing in healthcare, with the objective of increasing its technology diffusion.

It is not enough to come up with a solution that satisfy the needs of the customers. In B2B, a great relationship between supplier and customer is fundamental since the success of one is usually the success of the other. Helping a potential customer and an existing

customer to see the features, functions and benefits of the offers, will increase the diffusion of the same offers among individuals, resulting in more profits for the supplier.

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