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Innovation management and the procedure of substituting products by analyzing a concrete project in water based air-conditioning systems in Iran

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Master thesis

Innovation management and the procedure of substituting products by analyzing a concrete project in water based air-conditioning systems in Iran

Presented by: Nima Akhvas

Advisor professor: Marie-hélène bihr



Master2 Thesis

Applied corporate management

2018-2019



Preface

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Abstract

This thesis attempts to address the concept of product innovation and investigating all the various aspects and procedures concerning this issue. Firstly, looking into the concept of potential initial idea and all the qualifications needed to distinguish the difference between invention and innovation and then the process of turning the raw idea into innovation would be investigated to tackle probable challenges and common vague estimations. Additionally, the role of innovation in modern enterprises would be analyzed in details.

The theoretic framework also provides an overview of the procedure of substituting a new product in the market in order to enhance productivity, efficiency, sustainability, etc., and all the steps of entering the new product into the market including challenges, failure or success factors and all related terms.

Besides the theoretic view, this thesis benefits from a real concrete example of doing a detailed research on a patented innovative idea to run a company and substitute the new product (super absorbent powder) in the market in field of water based air-conditioning systems in Iran. In this section, this thesis employs a market survey conducted by the writer and also a very detailed business plan to explore the mentioned project in terms of financial issues like investment, profit, break-even point, etc., which would present a clear perspective of the whole project and a basis in decision making part.

Keywords: Innovation, Innovation-management, substituting product, air-conditioning systems, Super absorbent powder, business plan

Part 1: Introduction

1.1. Project introduction

Generally speaking, this thesis attempts to address the concept of product innovation and investigating all the various aspects and procedures which an initial raw idea goes through until transforming to a commercially successful product. Firstly, in this part of thesis some theoretical issues regarding innovation procedure would be investigated in details. The main areas of focus would be the concept of new and brilliant ideas and how an initial idea would turn into an innovation and going through this process what obstacles and risks would emerge. Besides these, the key success factors and characteristics which are vital for an idea to become a successful innovation would be investigated to get a clear view in order to recognize the innovative idea and all its qualification and different ways to evaluate them on a theoretical and practical basis.

On the next step, this thesis attempts to look into the importance and value of innovation management in the modern world and how different companies handle that in their unique ways to take benefit and add value from that. Factors like market conditions, demand and value needed to create or satisfy would play a crucial role in this section.

Besides these issues, there is another crucial factor which is the procedure of substituting a product in the market. Taking into account that new products have a poor success rate and only 1 in 5 survive more than a year a very detailed study seems vital in this area because only offering a new product to the market does not guarantee the success of the project unless different angels of the project get assessed in details. Crucial terms like competitive advantage, customer needs, target market and its characteristics and so on are meant to be considered.

Alongside investigating these main areas of focus, a concrete example (which would be about the water based air conditioning systems and how to optimize its performance and productivity and

also solve all the problems the consumers encounter with by proposing an innovative substitution product) would be analyzed to apply the findings and also a business plan would be proposed in upcoming chapter about this product to have a wider and accurate perspective of measuring the project applicability, profit, investment and so on. Regarding the problems the consumers face by using the products, to have a reliable view of the popularity and how common these problems are, two online surveys has been done which would be included in the same chapter.

1.2. Research objectives

In this thesis, some primary questions are expected to be answered:

- What are the process and qualifications of transforming an idea to an innovation successfully?
- How the procedure of bringing new and innovative products in the market works?
- In terms of the concrete example, what difference this product make in the market? Does it fill a gap or meet a special customer requirement? How this product is better or different from existing products? What is its competitive advantage? How much is people tendency to replace the traditional product? How the project will go in terms of finance, profitability, investment, risks, etc.?

To sum up, the project and its mentioned questions and objectives would be addressed through 3 main methods:

- Desk research

Investigating the whole process of transforming a raw innovative idea into a successful innovation by studying all the procedure, steps, qualifications needed in details based on theoretical view.

- Online surveys

To have a more reliable estimate of the market condition and people opinion about the existing products and its probable problems or dissatisfaction online surveys would be performed.

- Business plan

Finally, a business plan would be written to provide the opportunity to have a wider view of the concrete example applicability, profitability, investment, etc. to have a wider perspective for decision making

Part 2: Desk research

2.1. Concept of innovation

as a general and common view, innovation is being defined as creating something new, renewing, performing new technologies and methods or constituting a new organization (Jerzy SZKUTNIK, 2018). In other words, in a broad view, the procedure of transforming an initial idea into a product or service which generates value could be described as innovation. Innovation involves brilliant ideas and new usage of information, imagination or initiative in order to get greater values from resources (Beatrice.2017).

One of the factors playing a crucial role in this issue would be creativity. denying the importance and effect of creativity in an innovation process seems impossible. achieving success in modern economies relies deeply on innovation and creativity which are critical elements. that is the reason creativity has a strong relationship with innovation. That simply means that while creativity is the birthplace of producing new and unique ideas, innovation is the implementation of that creativity leading to the emergence of a new idea, solution, process, or product, the driving factors behind innovation and merging them in order to look at things from a different perspective and moreover, from not being bounded with limitations by rules and various typical norms of the environment. Creativity and innovation can be recognized as unquestionable directions to success (Beatrice,2017).

Innovations discover new awareness which then go through dispersion, expanding the capability of the economic-system to conceive unique products and more efficient methods of operation. Innovation could emerge in different shapes which four main areas can be specified as follows (Jerzy SZKUTNIK, 2018):

- Product innovation: changes in the products or services offered
- Process innovation: modification in the methods of production and delivery
- Positioning innovations: changes in the situation in which goods or services are proposed to the market
- Innovations of paradigms: changes in the main spiritual models which forms the foundations of a company

The basics of innovation remain unchanged despite the various types which could be in products, process service, etc. So, as we all have capabilities, innovation can occur anywhere through anyone (Beatrice, 2017). However, this is not the only categorizing and actually far many classifications exist for innovations. A broader category for this issue could be presented below:

- Innovation as an outcome: Innovation as an outcome highlights what outcome is being chased, including product innovation, process innovation, marketing innovation, business model innovation, supply chain innovation, and organizational innovation
- Innovation as a process: mainly focuses on the way in which innovation should be regulated and so that outcomes can come to accomplishment; this includes an overall innovation process and a new product development process
- Innovation as a mental concept: attempts to identify the concept by connecting the innovation to inner inspirations of individual members of the organization where innovation is inculcated and emerged along with the creation of a complementary organizational culture that encourages innovation to grow and extend (Kenneth B. Kahn, 2018)

2.2. Innovation generations

Investigating the background of innovation models' advancement paths, they mainly are categorized into 3 primary generations (A.J. Berkhout, 2006):

- The traditional generation which is the first and linear model would be identified by consequent processes which starts at research and ends with commercial use. This model considers market information very late so the risk of not being adopted and accepted by the market in this model would be very high
- The second model would be innovative process focusing on the stream of information generated by the market. In this procedure pure science is replaced totally by market as the source of innovation and steps are consequent like the first model. The main drawback of this model would be too much attention and emphasis on market which leads to short-term projects
- The third generation innovations could be seen as “open R&D models” emphasizing product and process innovation and high tendency to concentrate on the company’s capabilities instead of solutions. Some features and characteristics of these three generations innovations are summarized in the table below.

Generation	CHARACTERSITICS
First	Technology push, linear process with markets at the end of the pipeline, scientific freedom is very important, no strategic goals
Second	Market pull, linear process with science at the end of the pipeline, contract research is very important, weak ties with corporate strategy
Third	Combination of technology push and market pull, innovation projects are linked to R&D and company goals ('open R&D'), strong emphasis on chain management

Table 1 characteristics of innovative models

Source: (A.J. Berkhout,2006)

Concerning the third model of innovation, a combination of market and science interaction which leads to a non-sequent procedure that could end up and summarized in a single graph. This graph represents the relationship and interaction caused by changes in industry and science and market and also the technology which are, in the end, are related to central element which is entrepreneurship.

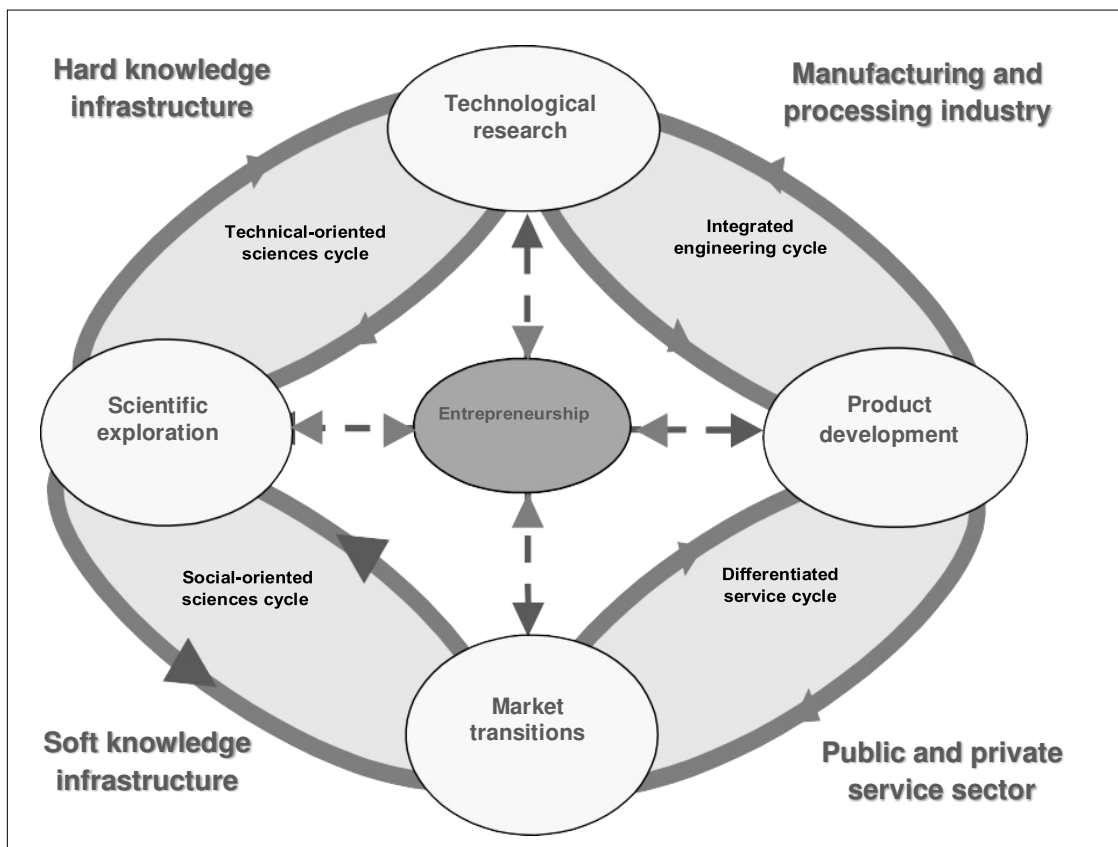


FIGURE 1 System model showing the elements of the innovative economy, a circle of mutually interacting dynamic processes: The Circle of Change. In the model, changes in science (left) and industry (right) and changes in technology (top) and markets (bottom) are cyclically interconnected. entrepreneurship is given a central role

Source: (A.J. Berkhout,2006)

2.3. innovative idea

This might be the most crucial issue that how to distinguish between a potential innovative idea and the one with no future and is there any way to anticipate the success or fail degree of an idea?

Not only every new idea would not be an innovation, but also not every new, potential and brilliant idea could go through the journey of innovation. Besides, what actually builds a new product is also arguable. Are new and improved products with minimal change really new, or should the new be referred for products with significant change? The concept new generally refers to products or services with considerable change that are extensively new (for instance, believed to be patentable). Our definition of new products would include significantly different new processes for manufacturing existing products, because a new process is itself a new product in the broad sense of the word. (stevens greg A.,1997). First, the idea must be evolved to make a new product, a new service, or a new process (invention) eventually possible. If this invention finds its place in the market with success in regardless of its form, whether products, services, or business processes, then, this idea has qualified to turn into an innovation (Bernd X. Weis,2015)

Idea + Invention + Diffusion = Innovation

Generally considering most industries, based on the representation of statistics, it appears to require 3,000 raw ideas to generate one extensively new commercially successful industrial product (stevens greg A.,1997). Actually, 3,000 raw ideas would be needed to come up with 300 filtered ideas on which the idea generator is willing to take minimum operation and response, such as performing a few simple experiments, filing a patent disclosure, we name collecting these 300 raw ideas stage 2. Approximately 125 of the 300 ideas in Stage 2 move forward to Stage 3 to convert to small project, usually having a high probability of receiving a patent. Approximately nine projects find their way to Stage 4 and end up in projects. Four of these go up to Stage 5 to become major

development efforts. Of the four major developments, approximately 1.7 are commercially launched (Stage 6). Of 1.7 projects commercially launched, on average only one (59 percent) is typically commercially successful (stevens greg A.,1997).

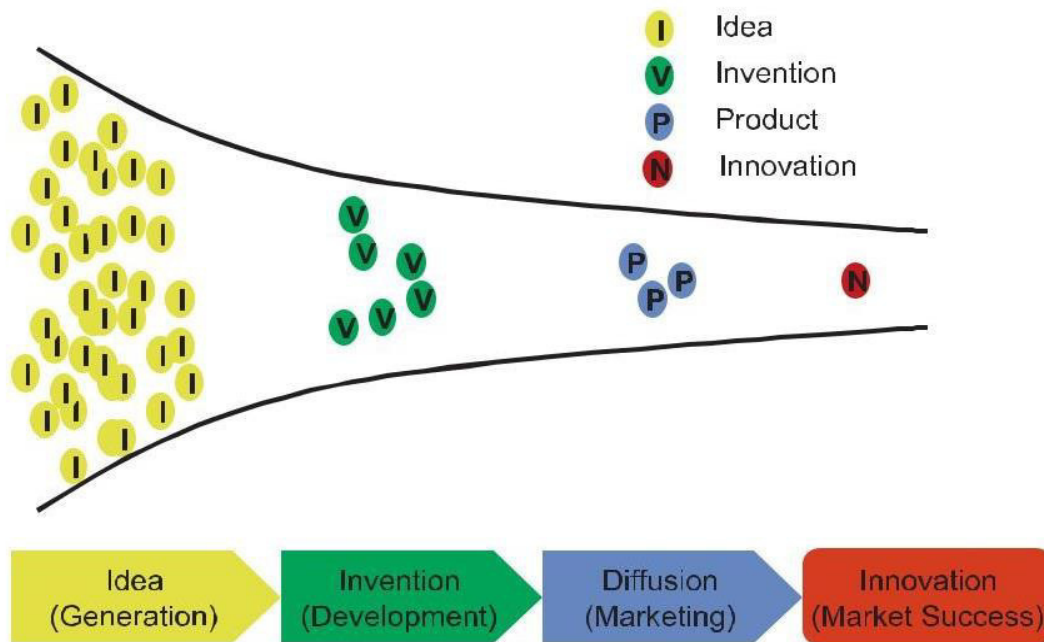


Figure 2 innovation funnel

Source: (Bernd X. Weis,2015)

As shown in the figure and numbers mentioned, the success rate of raw ideas is pretty surprising. This funnel shows the way ideas become inventions and how they generate products or services, which at the next step should find their place in the target market. In each of these steps, there are losses and Not all ideas could transform into inventions. most of them are therefore eliminated immediately. Others do not fit into the market, in which the firm operates, or into the corporate vision and scope so they are eliminated for those reasons. (Bernd X. Weis,2015). However, considering all the numbers and possibilities rates and statistics on this issue, there are

several factors to give us the success or failure probability of an innovative idea in different aspects.

The four main sources are:

- Patent activity
- Project activity in large companies
- Venture capitalist activity
- Independent inventor activity

-Patent activity:

For receiving the patent (US patent in this case) the invention could not be known or described in earlier publications or used by others, prior to one year before the date of the patent application. In addition to needing to be new, by law the idea must also not be obvious to one skilled in that field. Up to 10 percent of patents have some commercial utility (stevens greg A.,1997).

-Project activity in large companies:

Analysis of 284 projects at a large Midwestern company over a 10-year period represents that about 1 in every 8 were able to make money, with a positive revenue on sales net of all expenses while the success rate is closer to 1 percent for small projects (stevens greg A.,1997)

- Venture capitalist activity:

Out of hundreds and hundreds of good ideas and good strategies, only one or two are qualified funding, and only half of those will be a success in the real market. (stevens greg A.,1997)

- Independent inventor activity:

In one recent case, American Inventors Corp. of Westfield, Mass. acknowledged that its customers' success rate is well under 2 percent. In another case, several thousand customers had not received fees in excess of what they paid. (stevens greg A.,1997)

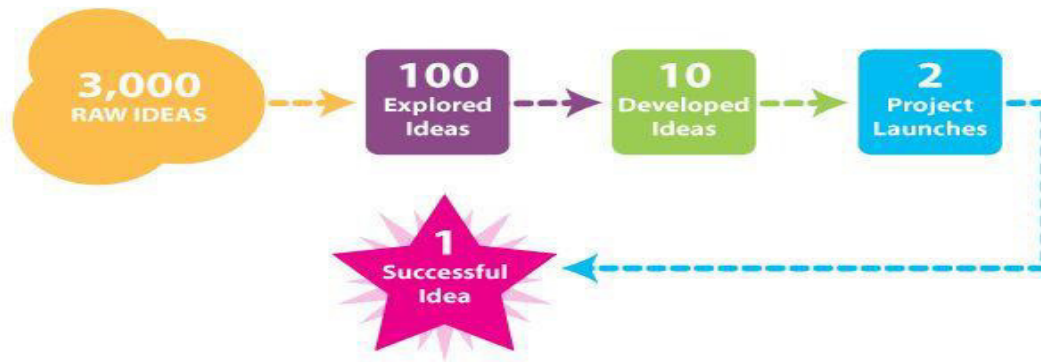


Figure 3 Idea success rate diagram

Source: Craig (2015) [online]

2.4. Innovation management

In this section the paper attempts to investigate the concept of innovation management from different perspectives and how the firms and modern organizations cope with this issue and take benefit from that. In the following, some well-known theories in this field would be analyzed in details.

Innovation management is the systematic planning, management, and control of innovation in organizations. Innovation management is about generation of ideas, their implementation into commercially successful products and services. Innovation management is part of the implementation of the corporate strategy. (Bernd X. Weis,2015)

Studying the different facets of how firms innovate has led to the creation of innovation management discipline although still regarded as an immature discipline. (Naqshbandi M.M., 2015)

2.4.1 innovation management theories

initially, some of the most well-known and widely-used innovation management theories like “diffusion of innovations”, “disruptive innovation”, “the Teece model”, and “the open innovation model” would be investigated.

-Diffusion of innovations:

The “Diffusion of innovations” theory by Everett Rogers an American sociologist, proposed in 1962 in a book with the same name. This theory, particularly concentrates on the factors that determine whether or not, and at what scale a new idea or innovation would be adopted and accepted by the members of a particular culture (Naqshbandi M.M., 2015). This theory investigates the process in which an innovation is communicated through certain channels over a period of time among the members of a social system. Based on this theory, there are four elements which play a key role on spreading an innovation or idea. They are: a) invention, b) channels of communication, c) time and d) social system. Rogers strongly believed that the process of adopting and accepting and innovation by a particular social system would be heavily rely on innovation sustaining itself, human resources and great need to adopt widely. While this theory has a great dependence on cultural context and social system it also concentrates on communication networks and the key role of these channels to adopt a new idea in a social system (Naqshbandi M.M., 2015).

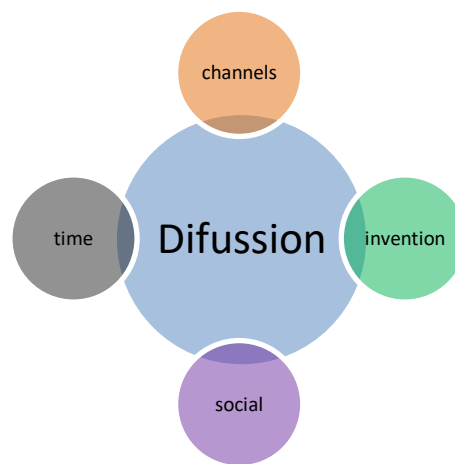


Figure 4 diffusion of innovations

Source: created to illustrate the current discussion

-disruptive innovation

Clayton Christensen proposed this theory in 1997 in his book "the innovator's Dilemma. This theory turned into one of the most significant theories innovation theories in no time (Naqshbandi M.M., 2015). Based on this theory, disruptive innovations are innovations which generate new market and networks and over a period of time disrupt the existing market and networks and replace them with new technology, networks and demands. Innovations named in this category upgrade products, services in such a way that market does not expect. A great example of disruptive innovation is how the telegraph was replaced by the telephone. These kind of innovations emerge in their market during a process and time-period. Disrupted innovations may not be initially wanted by the traditional customers and remain minor even though they may be cheaper in comparison to main-stream and familiar products but market disruption happens when the products based on disruptive innovation replace the main-stream products despite their better and more satisfying performance over time. Actually disruptive innovation already exists and customers already have and value but disruptive innovation makes it better and used the same concept in a different way to change the market. Hard disk drivers are such a concrete example in this extent. (Abi Tyas Tunggal, 2018)

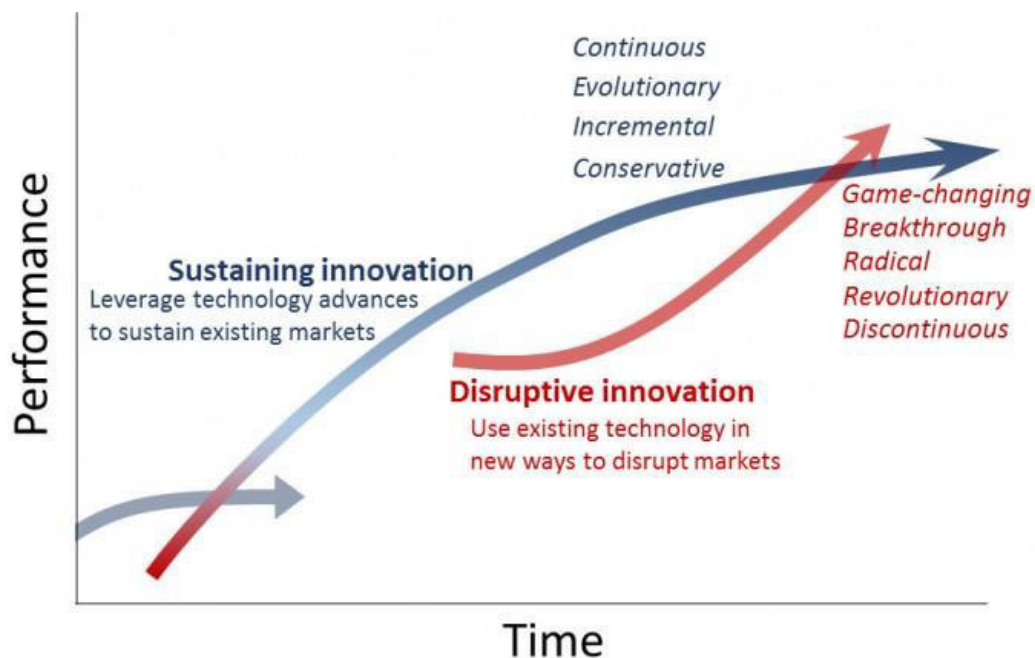


Figure 5 DISRUPTIVE INNOVATION

SOURCE: (Abi Tyas Tunggal, 2018)

-Open innovation

This theory introduced by Henry Chesbrough around 13 years ago. The theory is based on the use of both internal and external ideas of the corporate and also internal and external paths to the market. Actually this model is the opposite of the traditional model whereas internal research and development (R&D) of the firm was responsible for products development while this theory enhances to leverage both in-flow and out-flow of knowledge to stimulate innovation and expand the market (Naqshbandi M.M., 2015). In this model the boundaries of the firm are wide and external ideas and paths are as important as the internal ideas and internal paths to the market. As a result, there would be more interactions between the partner firms that leads to greater acquiring of resources and expertise in comparison to a closed-innovation model which eventually leads to faster innovations and providing the opportunity for the firms to take benefit beyond their competencies and resources.

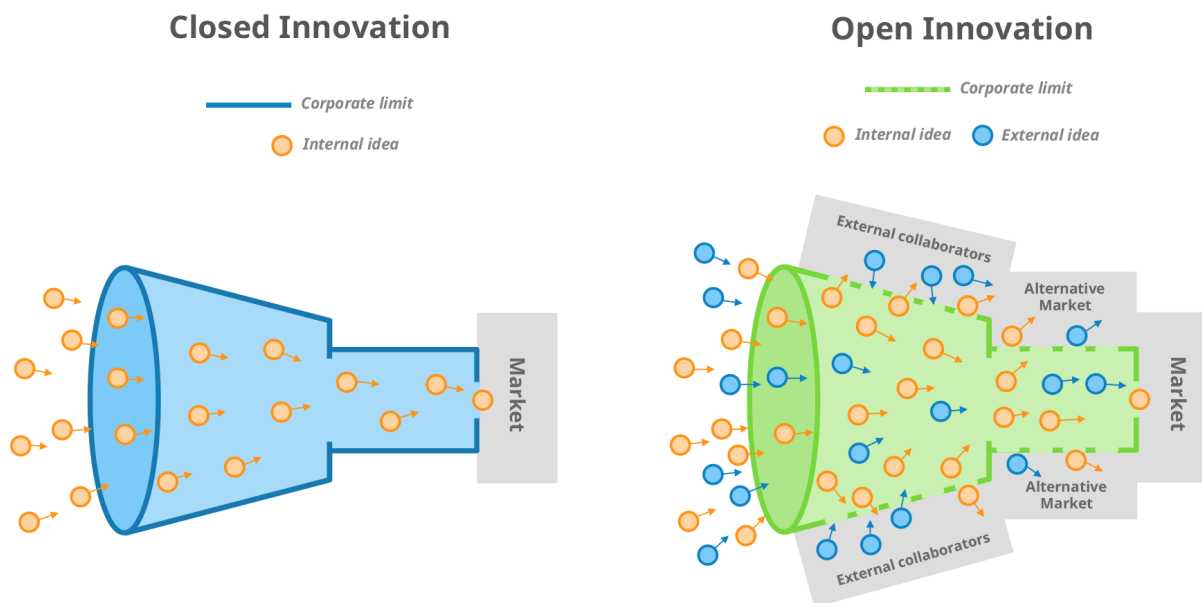


Figure 6 closed innovation and open innovation

Source: Atte Isomäki (2018)

-The Teece model

The Teece model published in 1986, besides attempting to foresee who will benefit from an innovation, tries consider the role and importance of two other crucial factors, technology imitability and complementary assets which has a great impress on taking benefits from an innovation based on this theory (Naqshbandi M.M., 2015). This theory actually tries to explain why some firms fail to gain economic returns from their inventions and why mere inventing is not enough for a firm to benefit from that but imitability and complementary assest are much more crucial factors. Immitabilty defines as how easily competitors can immitate or copy an innovation. To address this issue firms have to take some actions to protect their innovations before it is late. Actions like intelectual property rights and information protection considerations. On the other hand, complementary assest means all the assets that firms can use to make benefits and profits from an innovation. It includes all the acitivities like distribution channels, marketing, brand name, customer servise,etc. based on this model, these 2 taking this two factors into account and not only inventing could generate profit and financial return of an innovation for a firm.

Complementary assets

Easily available

Tightly held

imitability

Hard to make profits	Complementary assets holder wins
Inventing firm wins	Firm with highest bargaining power wins

Table 2 Teece model

Source: (Naqshbandi M.M., 2015)

As table 2 shows graphically, it will be difficult for a firm to benefit from its innovations if the immitatibility is high while complemantary assets that possess are not important and are easily accessed in the market. On the other hand, if the immitatibility is high and the complementary assetes a frim holds are important and not available in the market, it will profit from the innovation no matter who promote the invention. The profit margin however increase more in this case if immitatibilty is low (Naqshbandi M.M., 2015).

2.4.2. Innovation management in enterprises

The currently visible smart growth and the development of the economy based on knowledge and innovation, is one of the main activities currently indicated by the European Commission in the Europe 2020 Strategy which replaced the Lisbon Strategy. The primary and number one priority issue of these initiatives, as mentioned in the European strategy, is: Including all the units and regions in the innovation cycle: not only the largest companies, but also small and medium ones, from all fields and sections (European Commission, 2010). Technological innovation is a result of scientific and technical improvement and promotion, innovations in enterprises are highly related to entrepreneurship which makes it a necessary issue. The implementation of innovations in an enterprise is accompanied with a particularly high degree of risk most of the time. (Jerzy SZKUTNIK, 2018)

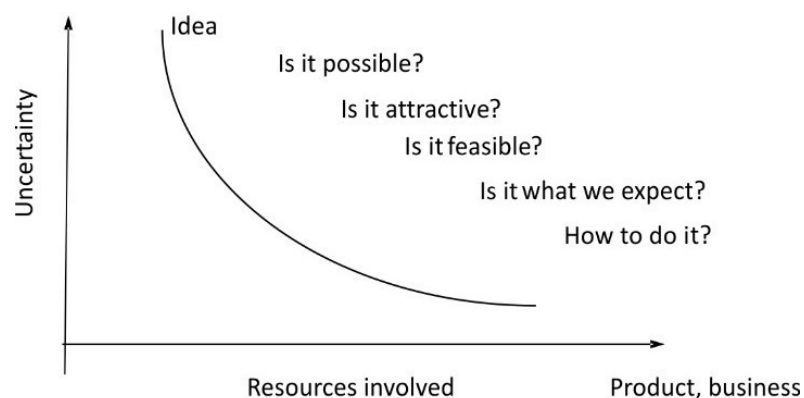


Figure 7 representation of how the level of uncertainty decreases according to the resources involved in an organization

Source: (Jerzy SZKUTNIK, 2018)

The process of discovering and performing new concepts in generating effective mechanism to absorb innovation needs to be done in three levels: employees, company and the economy (regional, national and transnational system). relating innovation with changes would cause the structure reform which may include visions, means, criteria, conditions, methods and effects. Therefore, it could be assumed that the concept of innovation in enterprises is defined as a change in the current economic system, including developing and implementing new solutions for an enterprise and improving the existing ones, which leads to improve the efficiency of the firm’s functioning, and as a result increase the efficiency of its actions and attract greater economic benefits (Jerzy SZKUTNIK, 2018). All this process and such beneficial results mentioned, does not only depend on technical knowledge, but also on other forms of knowledge that in a certain period of time have a great potential to create innovations within products and processes. To mention some of the primary elements “ the links with other companies and public research institutions”, “institutional framework in which companies operate”, “the role of demand” could be the most crucial ones.

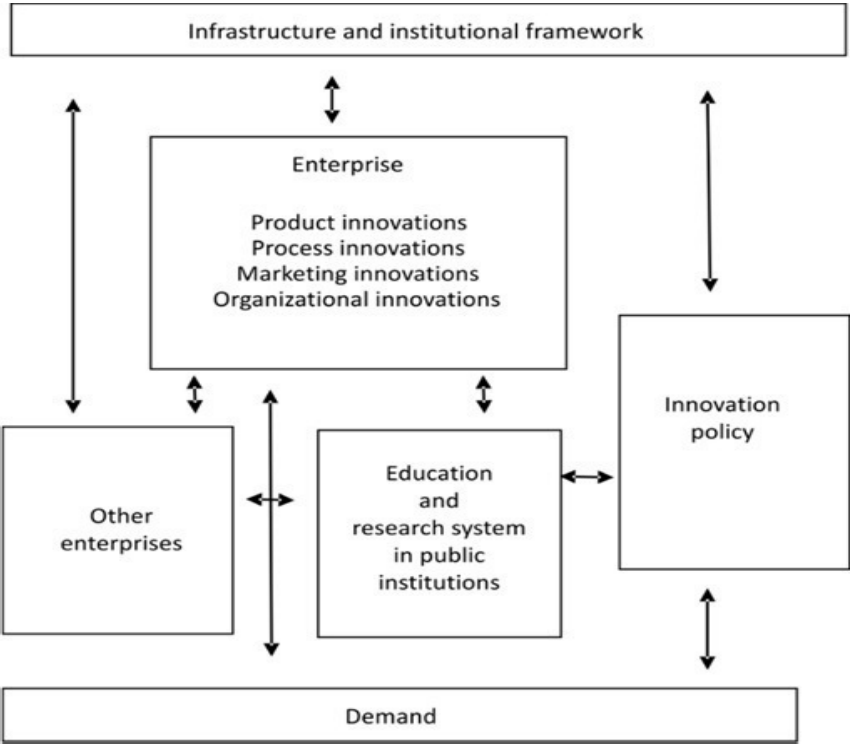


Figure 8 The proposed system for measuring innovation
Source: (Jerzy SZKUTNIK, 2018)

2.4.3. Innovation culture in organization

culture could be defined as “a pattern of shared basic assumptions that was learned by a group as it solved its problems of external adaptation and internal integration that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems” (Schein 1985). Innovation culture is an organizational culture in which creativity and innovations can advance and highly valued and encouraged. there are typical behaviors, communication, and interaction patterns, and the people in it have particular mindsets and visions accompanied by innovative values.

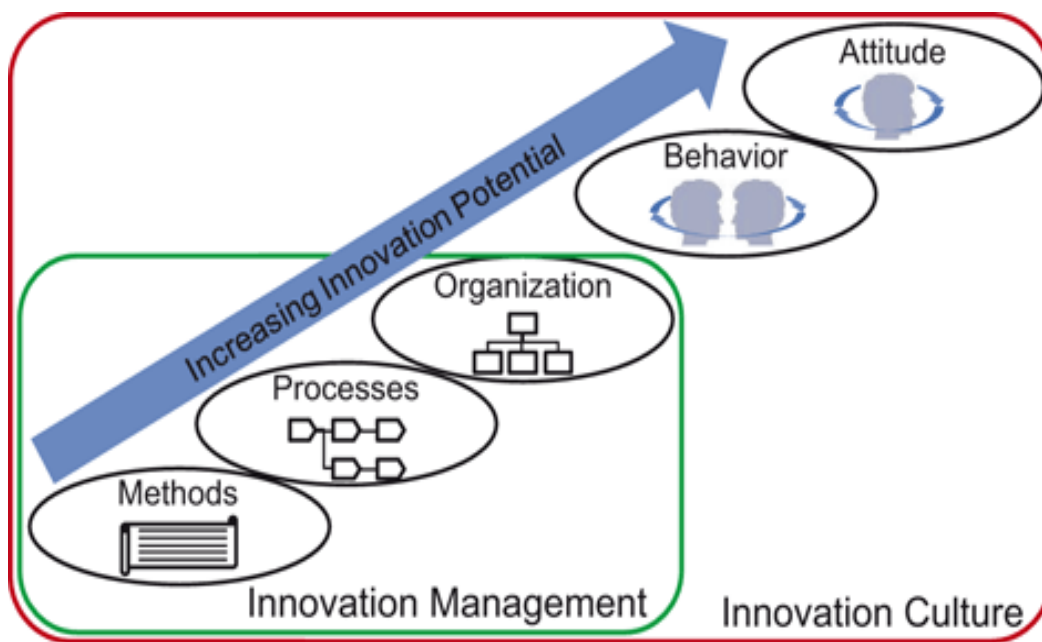


Figure 9 innovation management and innovation culture

Source: (Bernd X. Weis,2015)

innovation culture is mainly considered as an aspect of organizational culture, where the innovation culture always forms the context. Innovation culture is that aspect of the entire organizational

culture that aims to design structures and behaviors and values such that innovations are generated. The main characteristics of an innovation culture is:

- Vision
- Network of knowledge
- Inspiration and leadership
- Freiraeume [1]¹
- Creativity and risk-taking

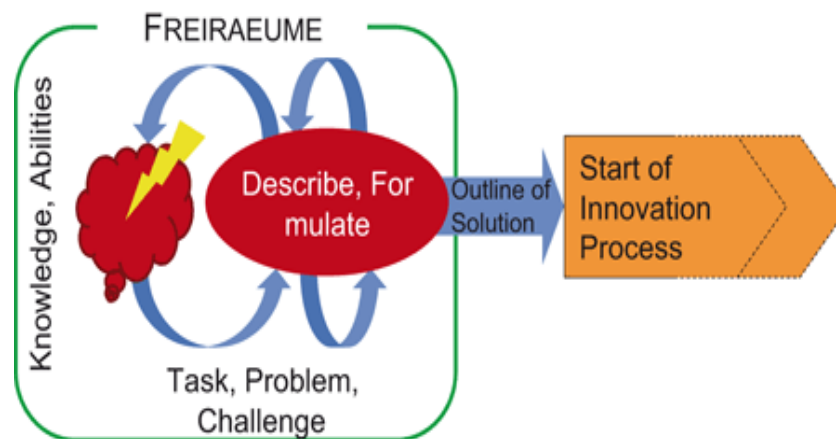


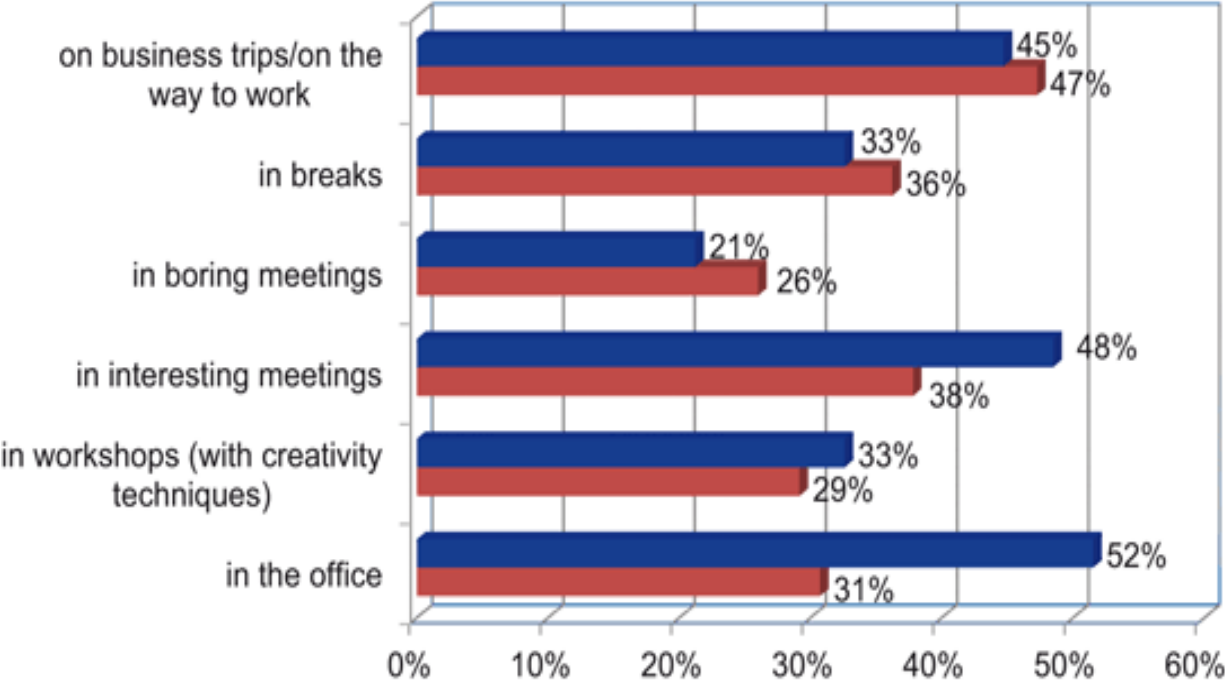
Figure 10 Freiraeume for creativity

Source: (Bernd X. Weis,2015)

where commonly ideas emerge, is a practical study of the author (Weis, 2015). Based on this research, ideas for sustainable innovations are conceived in equal proportion at work and in spare time. However, ideas for disruptive innovations are perceived only 35 % at work, but 65 % in spare time—a more detailed statistic of where ideas are perceived is found in Fig 11. A large amount of ideas for innovation are conceived in off-topic situations (71 % for sustainable, 83 % for disruptive innovations). This makes it clear that Freiraeume are not only limited to the organization, but that other contexts significantly affect creativity and innovativeness. Innovation culture does not stop at the boundaries of the organization.

¹ The German noun "Freiraeume" refers to what is ordinarily called "free space," and also what is called "room for ideas", "room for self-actualization" and the likes. "Freiraeume" refers to the kind of opportunities given, that allow to pursue activities that are not on the specified agenda, e.g., to create and follow up with new ideas. Translations coming near are "latitude" or "leeway"

Situations at work where innovative ideas are conceived



Situations in spare time where innovative ideas are conceived

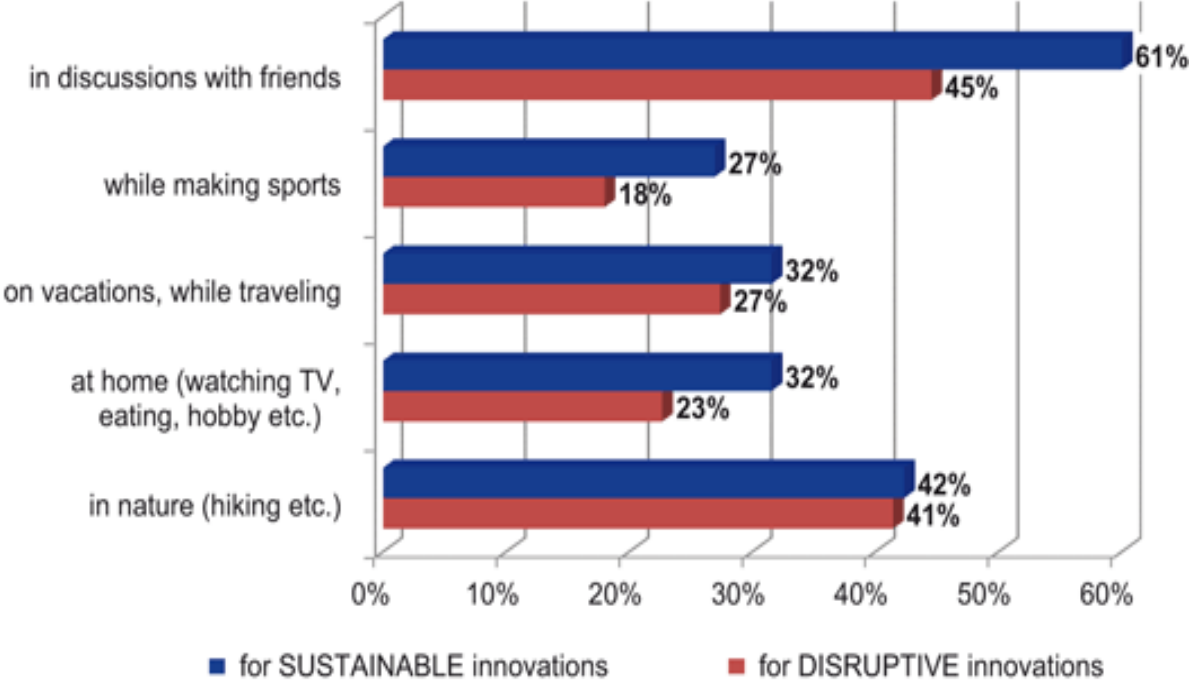


Figure 11 where ideas are conceived

Source: (Bernd X. Weis,2015)

2.5. Product innovation and new-product development

Innovation development could be identified as the conceptualizing, forming, promoting, verification, and commercializing of new products in terms of customers and markets. This concept involves the creative responses and solutions for meeting the needs and expectations of customers and the market by improving existing products to discovering entirely new ways of satisfying customers and stakeholders. Looking from an internal angle, product innovation depends on the knowledge, experience, capabilities, resources, and the current technologies of the firm. From an external view, product innovation focuses on customer and market needs, desires and expectations. Customers desire outstanding products and services with high value, great benefits, high quality, and ensured reliability. The eventual challenge of product innovation is satisfying such expectations and needs. Product innovation proposes new solutions to old problems; generates new opportunities to existing capabilities, resources, and assets; ensures sustainable outcomes through the systematic substitution of products; and creates new capabilities and resources for sustaining the future. Product innovation seems to be challenging because the business environment would be complex, the changing needs of customers and markets, the impact of competition, and the difficulties accompanied with appreciation the present and anticipating the future. The business environment includes the social, economic, political, ecological, market, and technological forces that play a role on the organization making changes and providing opportunities and challenges. Social and economic forces have crucial effects on stakeholders and other members of the organization. Political and regulatory factors establish mandates that drive the need for new products. Ecological factors are critical for maintaining a sustainable position in the future. Market forces commonly effect the durability of existing products in the market place. Changing market conditions and trends make new situations that may not be satisfied by existing products. Technological forces provide new ways and means of coping with customer and stakeholder needs and providing the procedures to create the products that customers desire, expect, or would like if they were available. All of these forces provide the chance to create new solutions for satisfying the needs of the business environment and fueling product innovation. All these factors and interactions is shown in the figure 12 below. (David L. Rainey, 2005)

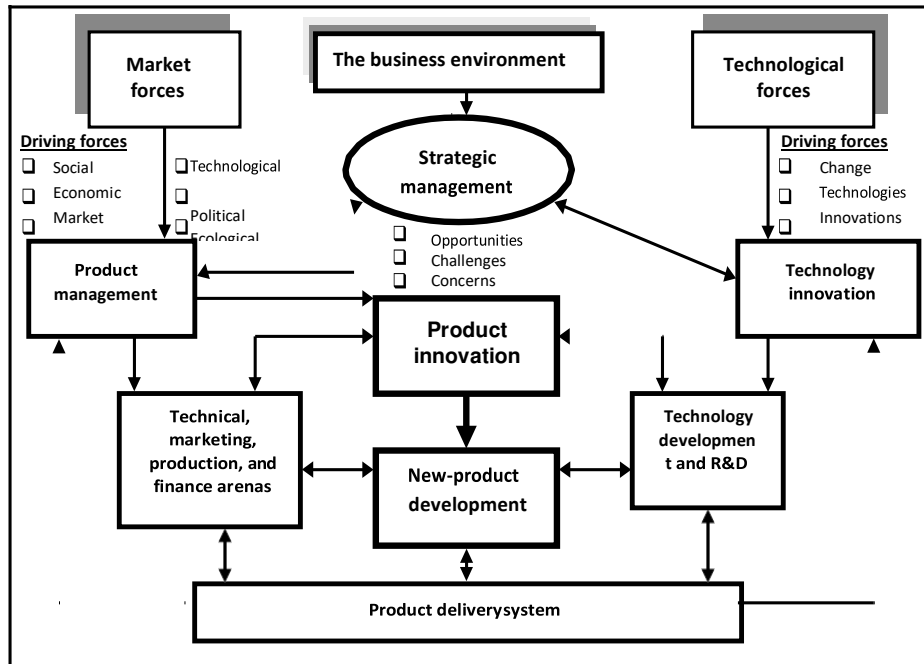


Figure 12 Simplified model of the primary elements of product innovation

Source: (David L. Rainey, 2005)

2.5.1. customer behavior analysis in terms of innovation

Behavior, as defined in Cambridge Online Dictionary, is the reaction of a person, an animal or any other substance in a particular situation, conditions with particular stimulus in a particular environment. Consumer behavior is a sub-category of individual's behavior including specific actions and choices directed on consumption activities to analyze the motivations and internal forces, which result in the purchasing and consumption behavior. Through the process of needs satisfaction, an individual learns, gains experience and consumption knowledge (Hoeffler and Ariely, 1999). Such experience is also gained by observing and communication. The advancement of needs and desires in various forms leads to the creation of attitudes and preferences. Economists often agree that preferences are shaped with time and the more experience consumers get the more stable are the preferences (Hoeffler and Ariely, 1999). The formation of preferences for a new product (new experience for a consumer) is made at the moment of its first meet or purchase or

consumption. The behavioral decision theory depends on the idea that consumers create their preferences at the moment of making choice each time, relying on the available information, in other words, customers arrange their consumption behavior based on their past experience and claim that the intensity of preferences grows with the experience. For innovative products which the learning process to explain value of the product is a more complex problem this is not the story because preferences are not available for these type of products and the environment is changed by the introduction of a new alternative. Choosing between a new product and other similar products require more efforts and risks. Consumers start analyzing the innovative product from the first “seller” and later have a possibility to compare with other sellers: “...consumer preferences are likely to evolve through time, updated through heuristic judgment processes...” (Carpenter and Nakamoto, 1989).

It should be noted that preferences are not only stable, but constantly changing. By changing the appearance of the new product the choices also change and the preferences possibly too. Preferences become more complex with learning and experience and through this process they would be modified. As a result, this level of complexity may not be considered as a steadiness of preferences but instead mean the formation of new preferences, preferences are indeed not stable and change during decision-making.

2.5.2. values and their general categories

Generally, values guide preferences and consumption choices and actions. But before getting into this concept, this term should be fully described.

Values are beliefs, meaning that when the value is in use it stimulates emotions and feelings. For example, when security or independence values are activated, in case of threat of them, individuals try to protect them and feel happy when they can feel and enjoy it. Values act like standards and criteria, because they guide individuals and their possible actions. Values could be classified into certain categories which the main ones would be:

- Personal values
- Product values
- Consumer values
- Cultural values

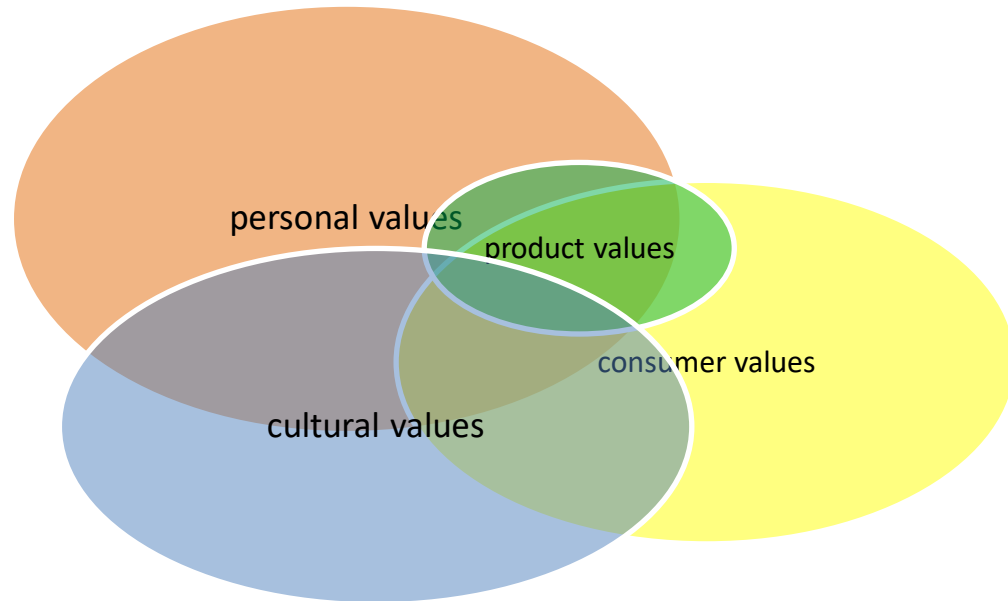


Figure 13 classification of values

Source: created to illustrate the current discussion

-Personal values:

Such values create generally a personality and can also be referred to as personal standards, rules, ideals which are constant in time and situations. The 9 main personal values based on Schwartz theory are shown in figure 15 (Schwartz, 1992).

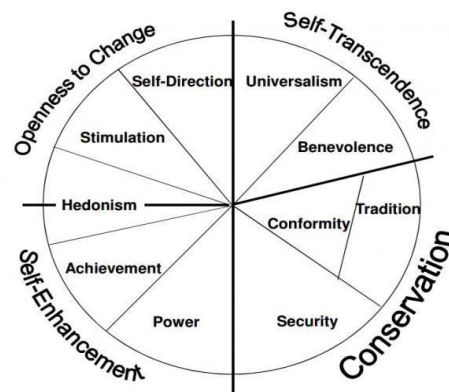


Figure 14 the personal values (Schwartz theory)

Source: Schwartz, S. H. (2012) [online]

-Cultural values:

another value classification proposed is cultural values, which consist beliefs, motivations and ideas about what is suitable for particular social and cultural groups of people (Overby, 2005). Values and beliefs which fit in the ecosystem survive and evolve, on the other hand, less suitable ones eventually disappear. cultural values and beliefs influence how people interact with their ecosystem. As personal values, these values are not dependent of any products, services, situation and circumstances.

-Customer value:

customer value represents a “value-for-money” concept (Sweeney and Soutar, 2001). Actually, value represents a transaction of buyers and sellers’ values which lead to customer satisfaction and loyalty, in case of superior value proposition and to dissatisfaction in case of minor value proposition by the seller.



Figure 15 customer fair-value line

Source: created to illustrate the current topic

-Product value:

the product itself has a value. Choosing between several alternatives, a consumer performs a value judgement. Because of the high number of products proposed on the market, the product itself should have a competitive advantage which is judged by the customer while making the choice. In consumers' perspective all the characteristics of his consumption experience are related to the product, as well as satisfaction and loyalty. The level of satisfaction will be different from individual to individual not because of the value of the product, but because of the differences in perception of the product and customers' unique judgment.

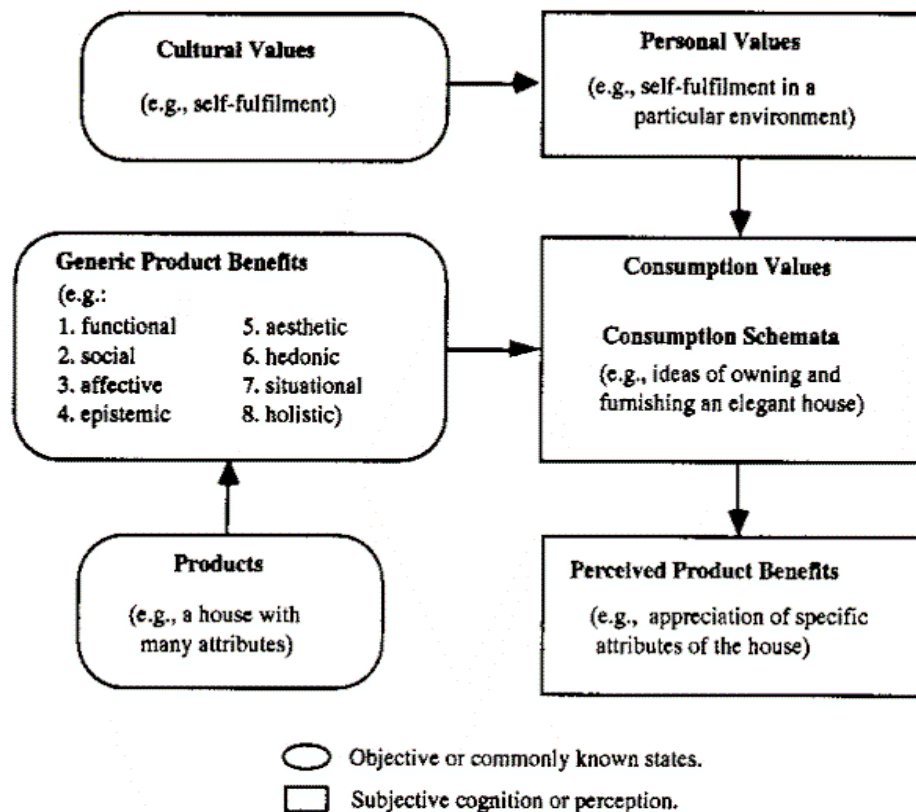


Figure 16 framework for product valuation for customers

Source: (Albert Wenben Lai, 1995) [online]

2.5.3. classification of customers

Generally, in terms of customers' attitude toward innovations, there are 5 groups of customers:

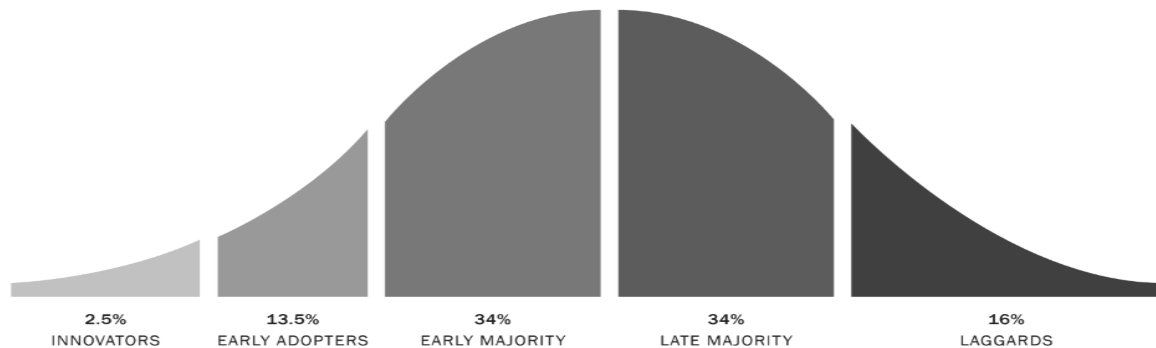


Figure 17 classification of customers

Source: (Cathy Sanford, 2018)

-innovators:

Innovators are usually people with good ingenuity, creativity and not afraid of taking risks. They are first to search information and accept innovations with open arms. Their level of innovativeness is much higher than the average, so usually other people are not influenced by them

-Early adopters:

The group of early adopters is opened to things which are new. They easily see the benefits which an innovation can give them and possible up-coming results.

-Early majority:

Early majority group consist of people more traditional, less educated and less likely to lead. They are more realistic, and as a result, more risk avoidant. They are not open to invest much time and money to learn and to try new products, so they try to avoid unknown issues.

-late majority:

This category are people who don't like taking risks and are not keen to change things. Such people are afraid of being outdated, so they follow the mainstream.

-laggards:

These customers are people who are completely traditional and have a high risk avoidance of all innovations. These consumers need a high motivation and encouragement to change their opinions if they do at all.

the acceptance and the adaptation of innovations depends on personal habits and values and the risks accompanied with innovations which is an inseparable part of every innovation. The strength of individual dependence to current situation or routine might lead to resistance to the new behavior installation. Because of the ordinary and traditional behaviour a consumer may not be paying attention to innovations or may not be willing to pay the attention. There is always resistance associated with innovations.

Deep understanding of consumers' values and preferences is crucial for the introduction of innovative products, because such products respond to consumers' needs and demand, which are new and of uncertain nature. And, more particularly, as the objects of our studies are eco-innovative products/services we suppose that environmental concern and values should be discussed because of the importance of this factor in today's world both in marketing and business side and also in social responsibility and environmental side of the matter. The difference between eco-innovations and ordinary innovations is in their intended lower level of environmental harm. Consumption of eco-innovative or sustainable products encourages the development of and is influenced by environmental values, which are also included in the concept of individual value systems.

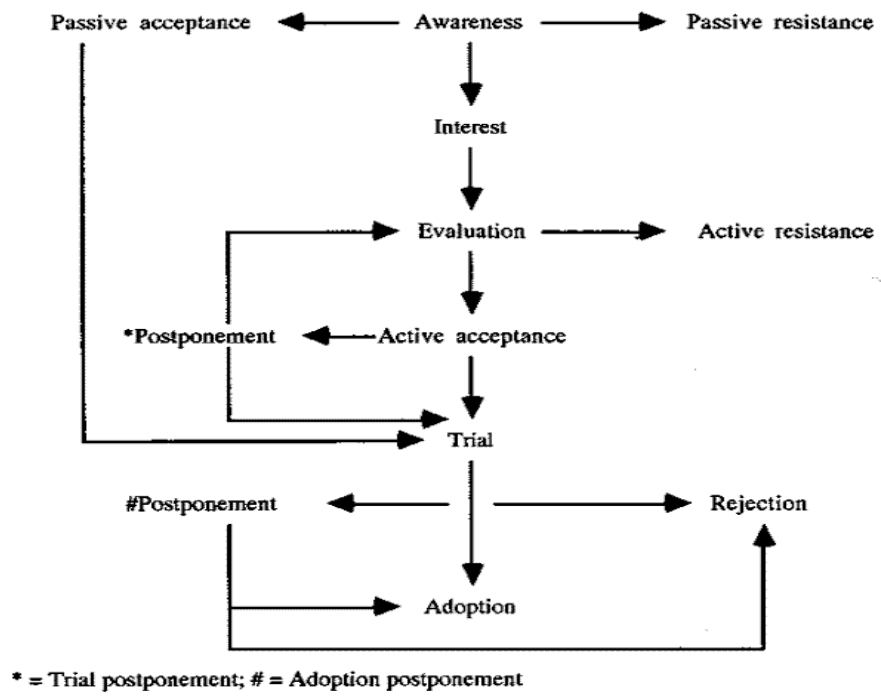


Figure 18 conceptual framework of innovation responses

Source: (Mohamed I. Nabih, 1997)

Part 3: An innovation-based entrepreneurship

In this part of the thesis, a real concrete example of innovation-based entrepreneurship would be investigated in details. This project is based on a patented innovation registered in 2012 by a team which the author of this thesis is among the four members. The details and certification of this patent is presented below.

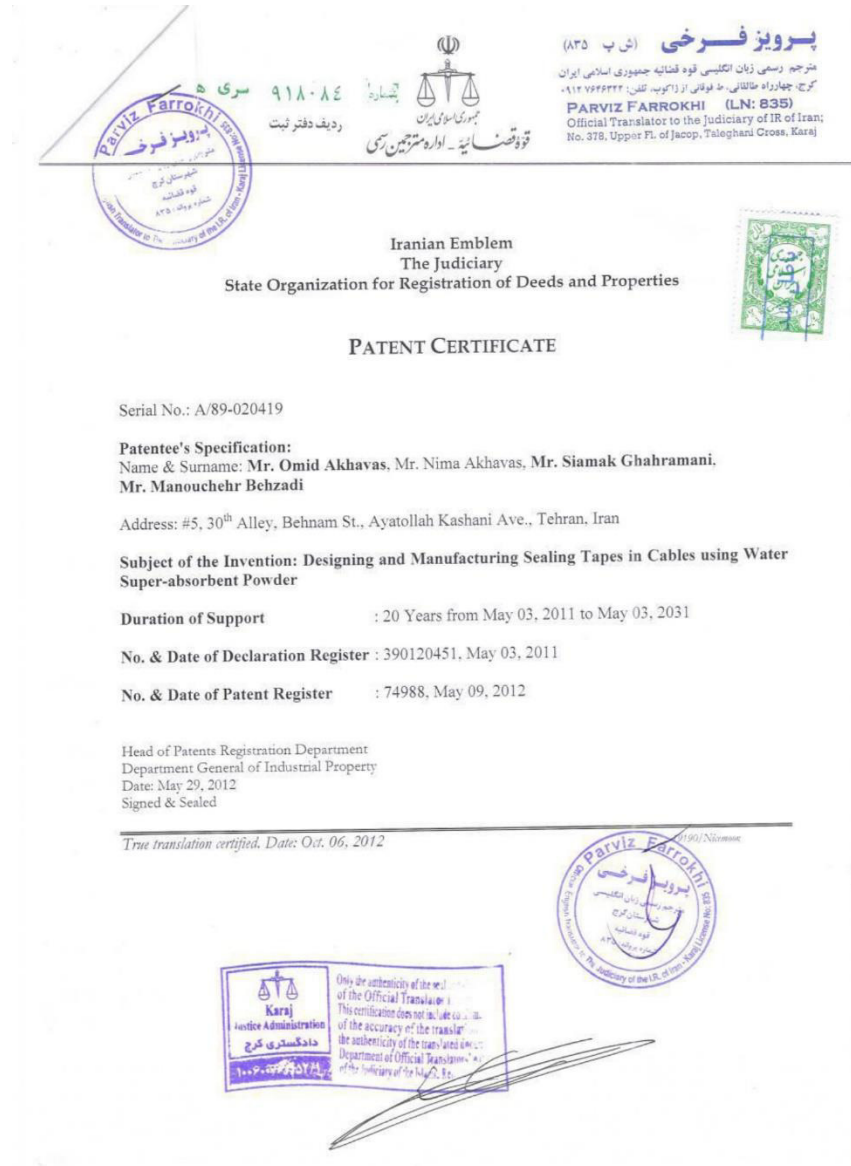


Figure 19 patent certification

3.1. project scope description

Generally, the project concerns water based air-conditioning systems in Iran. The ultimate goal of the project is removing old-fashioned wooden-straw frames of this installations because of a wide range of technical and hygienic problems and substituting modern plastic frames consisting super-absorbent powders which possess considerable advantages in addition to solving the old problems. But first of all some of the terms mentioned needs to defined and get cleared.

3.2. water based air-conditioning systems in Iran

Iran a middle eastern country, locating in a dry region of the planet, does not possess enough amount of water sources. Consumption of water far away from international standards on one hand and significant decrease of rainfall in recent years on the other hand has encountered this country with a water crisis and today's number one issue for its government (Elahe Etemadian, 2014). According to official statistics, up to 2018, there were more than 17 million of this machines in the country, using 20 litre water daily per each machine (S. Velayati, 2016). In other words, more than water consumption of an individual per day. actually, these systems add one person to each family in terms of water consumption which is a vital issue in Iran. Iran' population is about 1% of the world's population whereas its fresh water sources are just 0.0033 of the global sources. (Elahe Etemadian, 2014). The weather condition in this region could be positioned in hot and dry category so air conditioning systems are vital installations for houses, almost one for each house.

Country	Fresh water / person (cubic meter)
China	2062
USA	8838
Spain	2393
Japan	3382
Iran	1644

Table 3 fresh water per person

Source: (Elahe Etemadian, 2014)

The weather condition in this region could be categorized in hot and dry section so air conditioning systems are vital installations for houses, almost one for each house. The split air conditioning systems which are the common type all around the world are not much popular in Iran. The reason is their high initial price comparing to the purchasing power of the people and high electricity consumption (S. Velayati, 2016). The popular cooling system in Iran is water based air-conditioning systems and it has been used for many years unchanged to the time of writing this thesis. It is an equipment, particularly designed for this hot and dry weather, is consist of an electro motor, a pump, a floater and other electrical equipment, all placed in a box covered with frames in 4 sides which are filled with wooden straw. The process is that the pump get the wooden straw wet and dry and hot periphery outside make the water evaporate so the cold air produced of this process get transferred to the house rooms through ducts and channels provided.

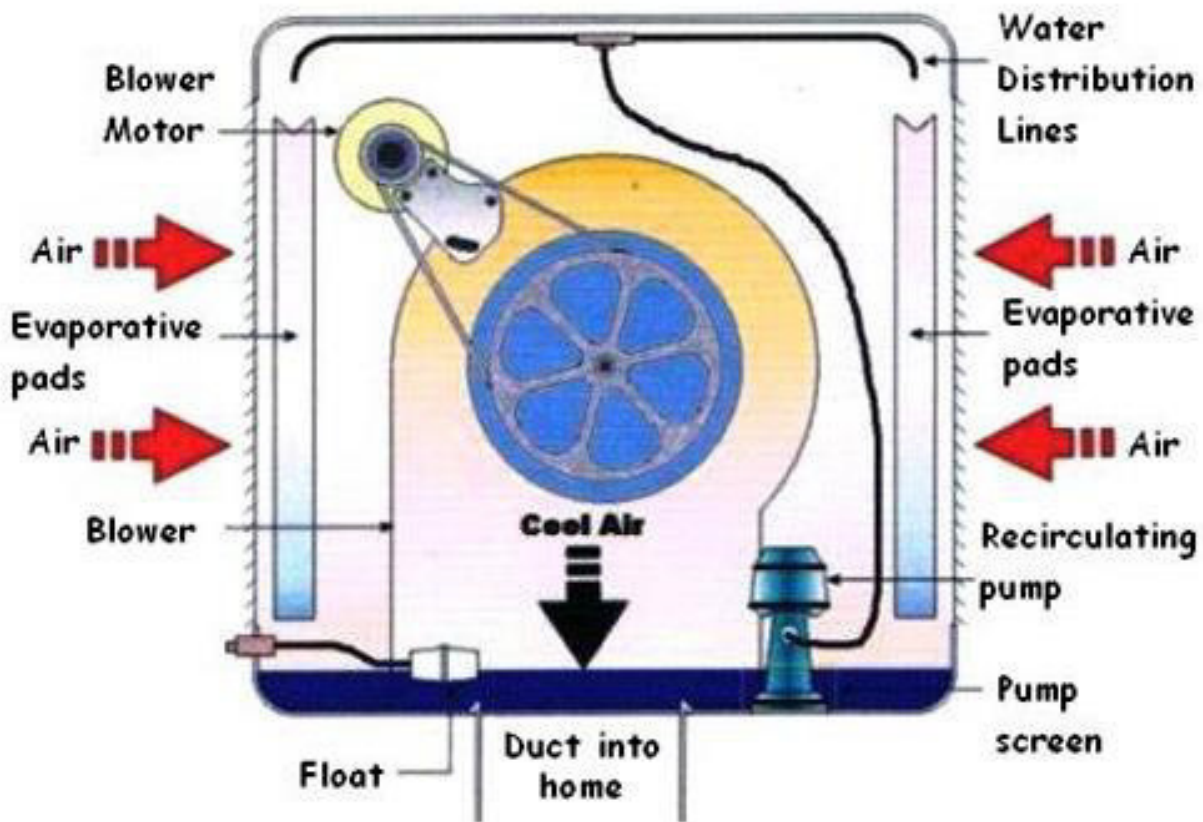


Figure 20 mechanism of water based air-conditioning system

Source: (building plus, 2017) [online]

Although the process and system has been the same and unchanged for many years but it does not mean it is perfect and the satisfaction of users is high without any problem. Several problems have been reported among the users and has been proved through an opinion survey conducted by the writer very recently.

- The first problem of this system would be its weakness in hygienic aspect. Since the wooden straw absorb dust and pollution so a considerable amount of dust and pollution enters the rooms which is extremely unpleasant and unhealthy particularly for children.
- The second problem is the too short life-cycle of the wooden-straw. This product needs to be changed at least once a year and it is a time consuming and unpleasant experience for people to change the frames every year. Beside this, even within this 1 year the wooden straw gets shrunk and the users feel that the air is not as cool as the initial days which is because the straw has been shrunk and hot air is entering the cooler internal space and increase the temperature.
- Another problem is the water consumption which is pretty high (the numbers discussed in prior section) and can be reduced up to 80%.
- Also the wooden straw is being produced from wood directly and it also seems deforestation is one of the most significant today's issues of this country in terms of sustainability because of the low share of forest in comparison to the areas of deserts (Mohamad Safarian, 2013)

Considering the huge number of users of this product in the country (17 million units) and the wide range of problems mentioned above, a great need for a substitute product to solve all these problems could be felt. The idea of this project is substituting wooden-straw by super absorbent powder.

3.3. patent details and advantages

- Super absorbent powder description:

Super absorbent powder is a kind of polymer which is able to absorb water about 300-400 times than its actual weight (Indřich Kopeček, 2010). The author of this thesis and colleagues as an innovative team has improved and optimized this product and increased this powder ability to absorb water up to more than 1000 times than its weight.

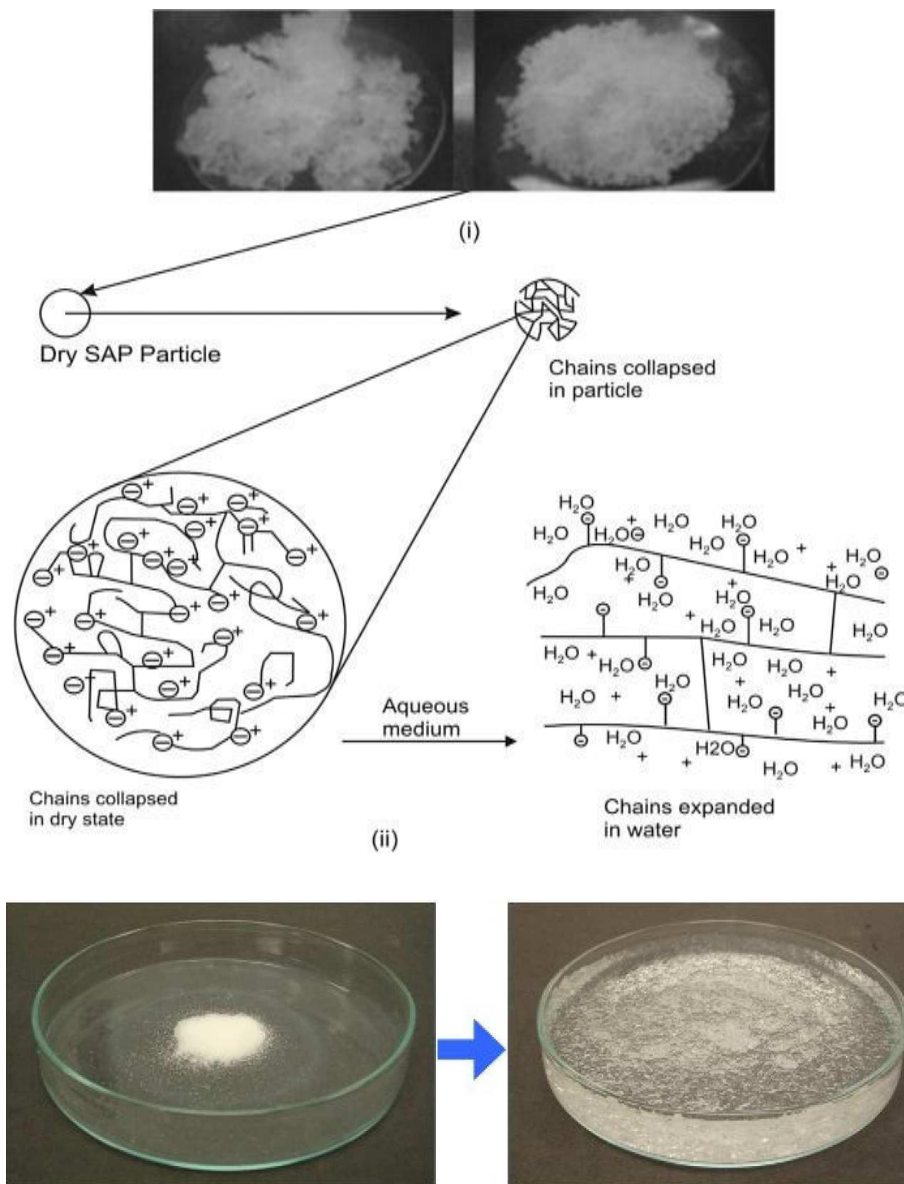


Figure 21 super absorbent powder mechanism

Source: (Shilpa Sharma, 2014) [online]

The idea of substituting this product would solve all the problems mentioned in prior section and some other potential issues.

- life cycle: by increasing the life-cycle of the product from 1 year to 7 years (indřich Kopeče, 2010) one of the annoying problems of consumers would be solved and there is no need to have the time-consuming and unpleasant experience of changing the frames every year
- Regarding the hygienic problem, the problem would be totally solved because the product does not absorb pollution like wooden straw but even by adding some substances like Nano silver it could have a cleaning ability (Negin Ghorbanzade, 2015)
- Another advantage is that the product would not shrink by time unlike the traditional one and in the end it is totally Eco-friendly because the powder decomposes completely after its life time without any harm for environment (Negin Ghorbanzade, 2015)
- The final benefit would be saving trees and wood sources and prevent deforestation by substituting this product instead of wooden-straw.

3.4. online surveys

Having known the various problems of the product would not be enough. Conducting a real survey could provide the opportunity to get familiar with different aspects of consumers' difficulties and give a broader view about the importance of each problem for them. Therefore, two online surveys have been conducted about consumers' experience with water based air-conditioning systems and all the troubles they face in day to day use of this product. The complete question form and results is presented below with the direct online link of the survey.

-survey 1 (103 participants)

3/18/2019

General report - Air-conditioning systems

When using air-conditioning, do you feel troubled and annoyed with the dust and pollution entering the room?

98 out of 103 people answered this question

1	Extremely	40 / 41%
2	Definitely	28 / 29%
3	Probably but not considerable	18 / 18%
4	Not at all, no trouble	12 / 12%

How important is the consumption of water for you? financially, environmentally and totally considering all aspects

99 out of 103 people answered this question

1	Pretty important	56 / 57%
2	Extremely important	38 / 38%
3	Not important	5 / 5%

When you change the wooden-straw every year, do you think the life-cycle of the product is short or enough?

95 out of 103 people answered this question

1	Yes, too short	72 / 76%
2	No, fair enough	23 / 24%

Do you believe reducing wood-sourced products and substituting them is an essential issue?

95 out of 103 people answered this question

1	Yes	80 / 84%
2	No	15 / 16%

If a new product was available today as a substitute of wooden-straw for same or lower price to solve all these problems (clean the room air, reduce water consumption, 5 years life cycle, Eco-friendly, etc..) how likely would you be to buy it for next year?

95 out of 103 people answered this question

3/18/2019

General report - Air-conditioning systems

1	likely	44 / 46%
2	Extremely likely	38 / 40%
3	Not so likely	8 / 8%
4	unlikely	5 / 5%

How likely are you to replace your current product with the new one?

96 out of 103 people answered this question

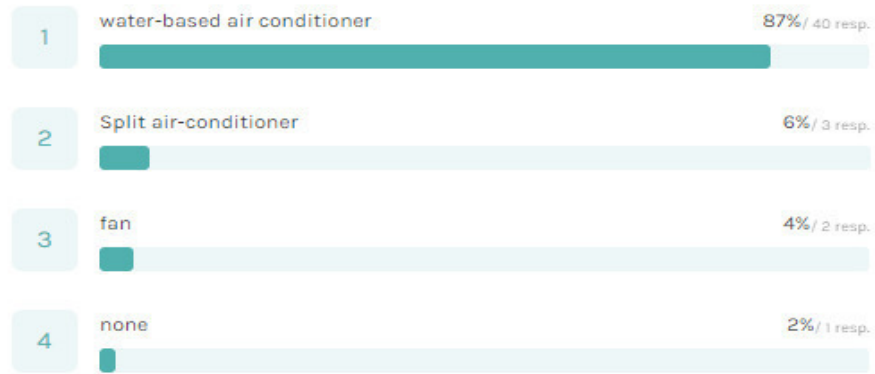
1	likely	45 / 47%
2	Extremely likely	21 / 22%
3	Not so likely	18 / 19%
4	Unlikely	12 / 13%

Online link to survey 1: <https://nimaakhas.typeform.com/report/E7N6xa/rp4NxX5llyp3bq9q>

-survey 2 (46 participants)

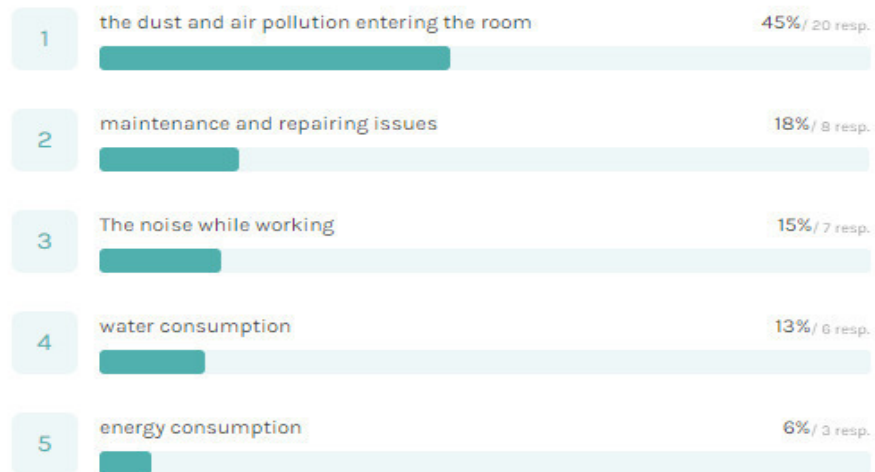
What kind of Air-conditioning system is currently being used at your place?

46 out of 46 answered



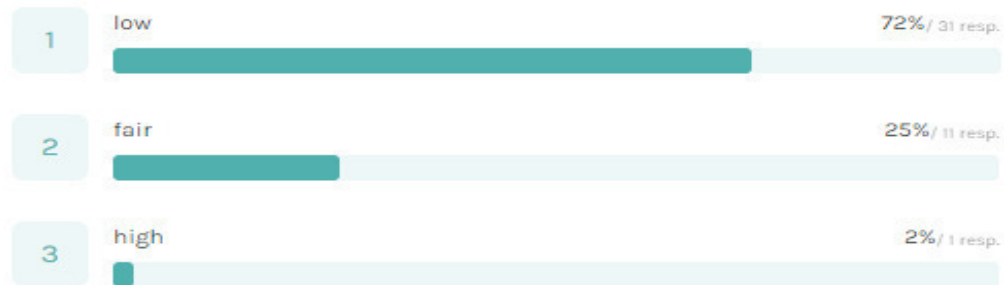
what is the most annoying problem while using your air conditioner system?

44 out of 46 answered



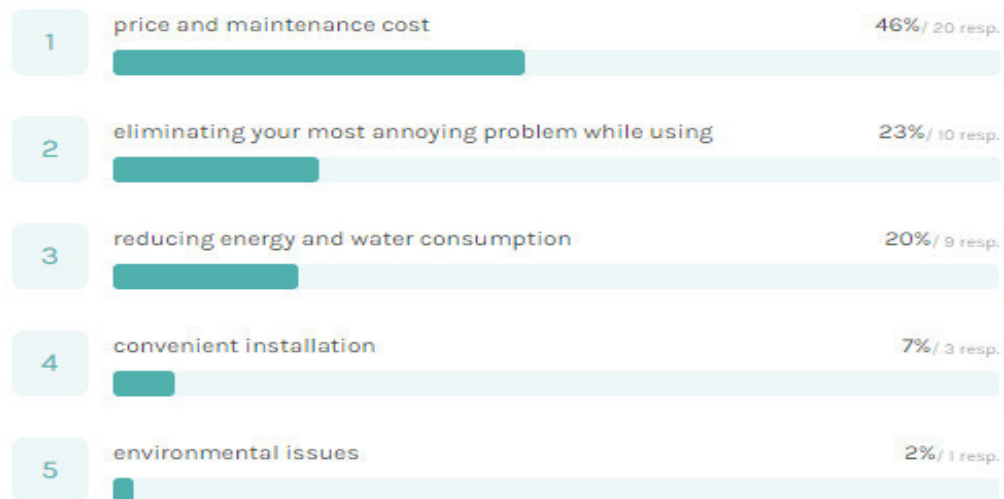
how would you describe your satisfaction level of your current air-conditioner?

43 out of 46 answered



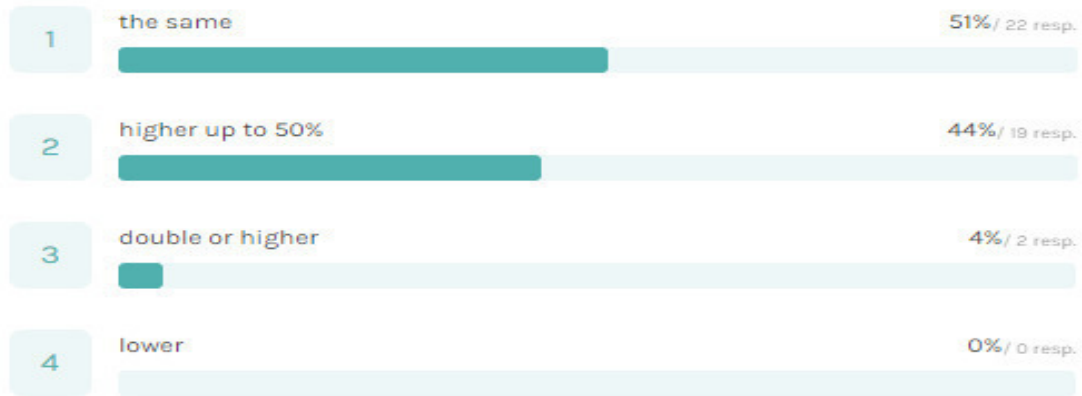
in case of introducing a new substitute, what factor would be the most crucial for you to give it a shot?

43 out of 46 answered



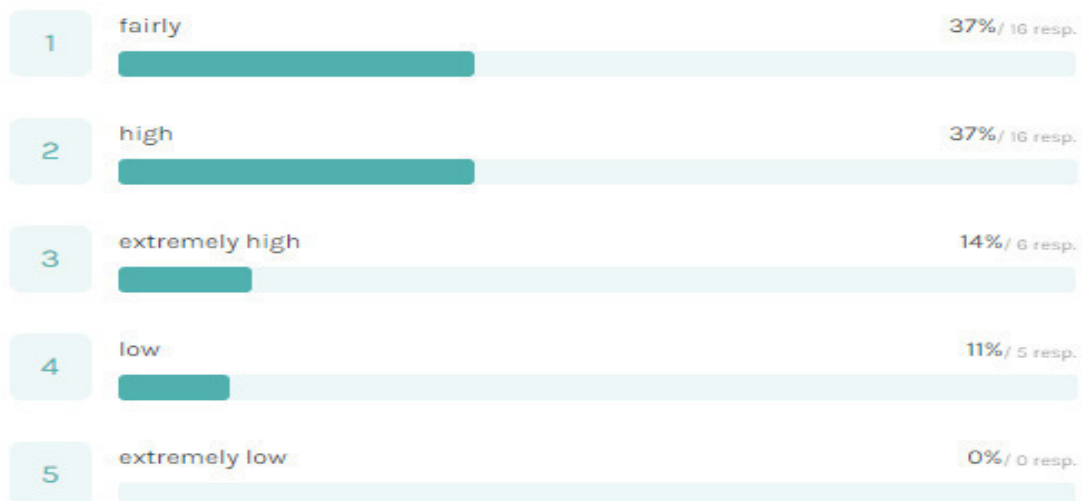
in case of introducing a modern substitute to solve your problems, how much you are willing to pay for that in comparison to your current product?

43 out of 46 answered



how much do you feel the need is great for you and people around you to solve your problem regarding your air-conditioner?

43 out of 46 answered



Online link to survey 2: <https://nimaakhas.typeform.com/report/cdzu9M/L1szhlvAB0NR8RTQ>

Part4: Business plan

Project title:

manufacturing plan of modern frames for water based air-conditioning systems by substituting super absorbent powder instead of wooden straw

Author of the business plan:

Nima Akhvas

Location of project launching:

Kheirabad industrial town – Arak - Iran

1) Introduction

Designing and constructing the manufacturing plant of innovative products require both proficiency in theoretical principles and also expertise in practical operations based on the current economic condition to gain to the identified goals of the whole project.

Investigating the possibility of launching the plant in terms of supplying the raw material, the amount of investment, providing the requirements of the needed technology by the current technical abilities and expertise availabilities in the region create the urgent need to perform a comprehensive detailed study regarding the financial and technical aspect of the project in order to gain to the efficient production, development and promote the quality of innovative product which eventually enables the company to compete in the market as a new comer.

2) The purpose of the project

The overview of this project is launching a manufacturing plant to produce modern plastic frames for water based air-conditioning systems. The final product is designed by removing wooden straw of the traditional types of frames and substituting a substance named “super absorbent powder” based on a patent registered by an innovative team which the writer of this thesis in one of the four members.

3) Classification of the product

Based on the classification of the ministry of industry of Iran the ISIC (international standard industrial classification) code of this product is presented in the table below.

Product name	ISIC code
Modern plastic frames	25201671

Table 4 classification of the product

4) Estimation of annual nominal capacity

Assessing the annual nominal capacity is a crucial issue in terms of this project's profitability and optimizing the investment. Therefore, choosing too low capacities would question the project's profitability and estimating too high capacities would increase the investment of the project heavily which could question the profits of the project again if it does not make sense. As a result, highest degree of accuracy possible in this issue is a crucial factor.

	product	Unit	Daily capacity	Annual working days	Annual nominal capacity
1	Plastic modern frames	piece	500	300	150,000
2	*Plastic modern frames	ton	1	300	300

*In this row the capacity is presented based on weight (ton unit)

*the weight of every piece is 2 kg.

Table 5 The annual nominal capacity

5) Anticipation of maximum operation

Reaching to the maximum production capacity would occur in the third year and will start from 70% in the first year and increase to 90% in the third year.

Year	2020	2021	2022	2023	2024
Working months	12	12	12	12	12
Operating capacity	70%	80%	90%	100%	100%
Produced amount(ton)	105,000	120,000	135,000	150,000	150,000

Table 6 anticipation of operating capacity

6) Sales forecast

The estimated amount of sales in following years is presented in table below:

Year	Unit	Unit Price (€)	2020 (€)	2021 (€)	2022 (€)	2023 (€)	2024 (€)
Plastic frames	piece	7	735,000	840,000	945,000	1,050,000	1,050,000

Table 7 sales forecast

7) Operational aspect of the project

The operational condition and working hours is presented in the table below. These data are based on machinery operations, off-days and vacations and the considered time period for machinery maintenance (65 days). The total working days per year is considered 300 days regarding the official vacations. The daily working hours would be 16 hours divided into three shifts.

Daily working hours	Daily shifts	Annual working days
16	3	300

Table 8 operational condition and working hours

8) Human resources estimation

Human resource and effective utilization of that, has a significant impact on every industrial company. Clear job description in various levels of the company and making sure of every employee understanding of his/her job is a basic principle of every industrial unit. There are different factors affecting hiring employees like the level of expertise required for the position, the level of technology and its complexity. Generally, the human resource needed for every position is divided into three main categories:

- Office personnel
- Production labor
- Indirect production labor

The table below represents the needed employees for every section.

Position	Person needed
Office personnel	4
Direct and indirect production labor	10
Total	14

Table 9 total human resources needed

Position	Person needed
Unskilled worker	6
Skilled worker	3
Quality control expert	1
Total	10

Table 10 direct and indirect production labor

Position	Person needed
CEO	1
Finance	1
Merchandising	1
Services	1
Total	4

Table 11 office personnel

9) Production procedure

The process of production is represented in the chart below.

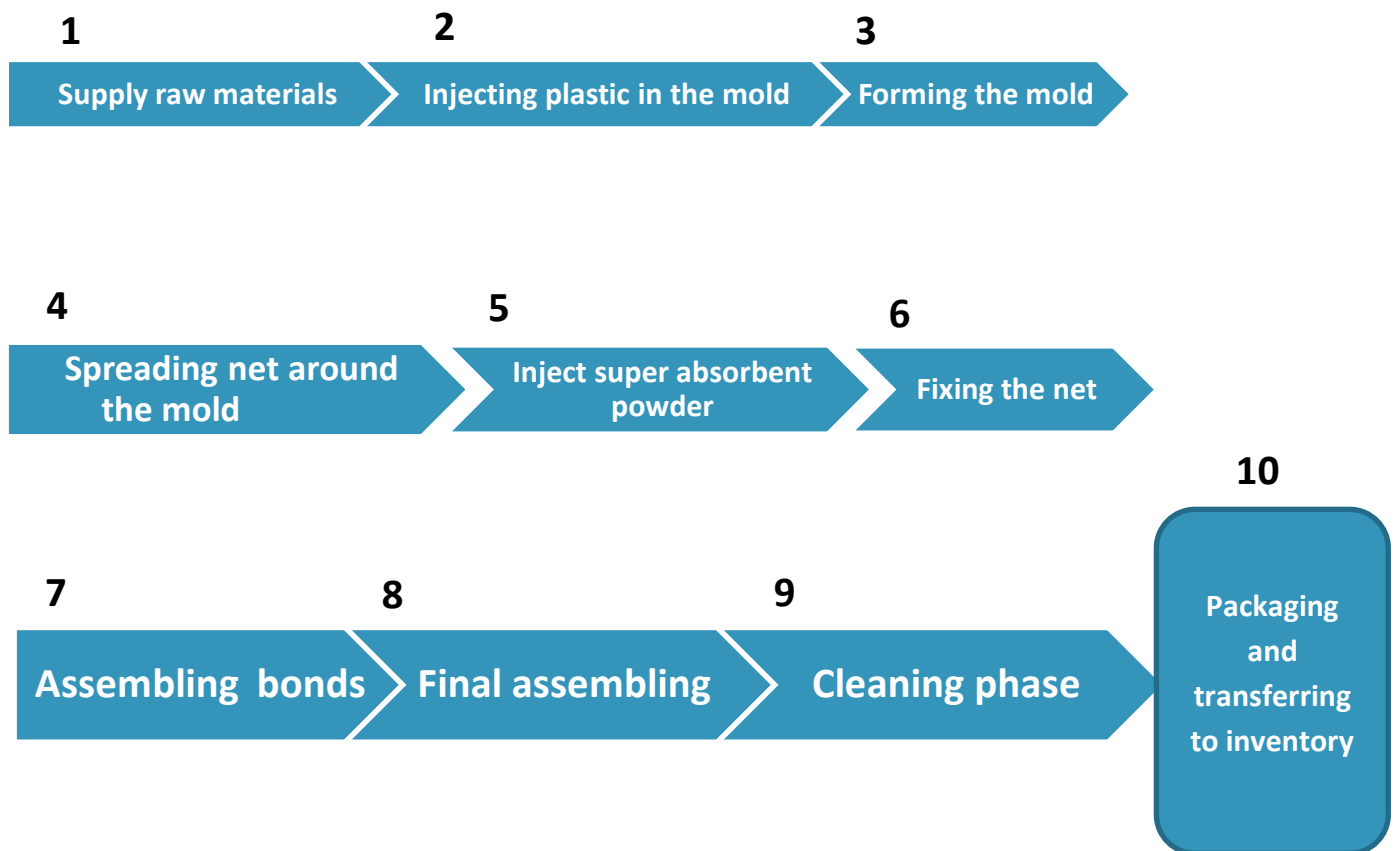


Figure 22 production process

Source: created to illustrate the current discussion

10) Project scheduling

Financing the project, constructing, supplying and installing machinery, etc. will take approximately 1 year to complete. Consequently, launching the project and reaching to expected capacity would occur in 2020.

11) Financing the project

In terms of fixed costs needed to launch the plant the following items would be considered:

- Land
- Landscaping
- Precast guard and office structures
- Primary production machinery
- Supporting production machinery
- Mechanical and electrical installations
- Transportation facilities
- Office equipment
- Unexpected expenses
- Pre-operation expenses

All the fixed cost mentioned above and also the pre-operation expenses is presented in details in table below:

Item	Cost (€)	Total (€)
Land	43,000	43,000
Landscaping	13,500	13,500
Constructing	103,000	103,000
machinery	65,350	65,350
Installations	20,700	20,700
Transportation facilities	5,350	5,350
Office equipment	2,670	2,670
Unexpected expenses	10,600	10,600
Total	264,170	264,170
Pre-operation expenses	10,000	10,000
Total of fixed investment	274,170	274,170
Working capital	160,000	160,000
Total project investment	434,170	434,170

Table 12 project finance

12) Details of fixed costs

-Land

the project would be performed in a land located in Kheirabad industrial town at Arak-Iran. The total current market value of this land is 43,000 euro as presented in details in table below.

Note: the value of the land is not ordinary price. Through the government program to support the entrepreneur innovators the price of the land would be much lower than the ordinary value

Item	Area(square meter)	Cost per square meter(€)	Value(€)	total(€)
Land	2,000	21.5	430,000	430,000

Table 13 Land details

-Landscaping:

The landscaping expenses detail is presented in table below:

Item	Amount	Unit	Cost per unit (€)	Total (€)
Boundary wall	400	Square meter	15	6,000
Landscaping and green space	200	Square meter	6	1,200
Land grading	1,000	Square meter	4	4,000
Asphalt	300	Square meter	7.5	2,250
Total	-	-	-	13,450

Table 14 Landscaping costs details

- Constructing

Constructing expenses for different buildings is presented in table below:

Item	Amount (square meter)	Unit cost (€)	Total (€)
Production building	600	127	76,200
Raw material inventory	100	100	10,000
Product inventory	100	100	10,000
Office building	30	150	4,500
Guard building	20	120	2,400
Total	-	-	103,100

Table 15 constructing costs details

- Installations

The detailed installations costs are presented in table below:

Item	Technical specifications	Unit cost (€)	Total cost (€)
Electrical installations	30 KW	9,350	9,350
Water installations	1.2 inch	3,700	3,700
Gas installations	2 1/2	6,000	6,000
Air-conditioning	-	1,350	1,350
Safety installations	-	200	200
Telephone installations	2 lines	70	140
Total	-	-	20,740

Table 16 installations cost details

- Machinery and equipment

Various machinery costs are presented in details in table below:

Item	Piece	Unit cost (€)	Total cost (€)
Plastic injection machine	1	30,000	30,000
Injection mold collection	2	4,000	8,000
Industrial sewing machine	2	5,350	5,350
Assembly table	2	3,000	6,000
Working equipment	1	1,350	1,350
Packaging machine	1	5,500	5,500
Digital scale	1	1,700	1,700
Laboratory equipment	1	2,300	2,300
total	-	-	60,200

Table 17 Machinery costs details

- Transportation facilities

For transportation a VAN is considered for the production site as below:

Item	Piece	Unit cost (€)	Total cost (€)
VAN	1	6,000	6,000

Table 18 transportation costs details

- Office equipment

Details of ordinary office and kitchen equipment are presented in table below:

Item	Piece	Unit cost (€)	Total (€)
Office equipment	1 set	1500	1500
Computer and equipment	1 set	1,000	1,000
Kitchen equipment	1 set	400	400
Total	-	-	2,900

Table 19 costs of office equipment

- Pre-operation costs

Pre-operation costs of the project include researching expenses and preparing plans, monitoring and project control and the expenses of trial launching. The details of all this expenses are presented in table below.

Item	Cost (€)	Total (€)
Preparing plans	950	950
Certificates and standards	400	400
Personnel expenses during construction	6,000	6,000
Personnel training	350	350
Trial launching	3,000	3,000
Total	-	10,700

Table 20 Pre-operation costs details

13) Working capital

Working capital includes the collection of assets utilized in order to enhance the process of investment by promoting and maintaining the project procedure. Each item has been calculated based on its specific period.

Item	Days	Total (€)
Raw materials	60	125,000
In-process product	1	2,400
Final product	10	24,000
Accounts receivable	2	5,100
Petty cash	10	3,900
Total	-	160,400

Table 21 working capital details

14) Production costs

The annual production costs include the following items which would be presented in details in following table:

- Raw materials and packaging
- Wages costs
- Installations costs
- Energy consumption costs
- Maintenance costs
- Depreciation
- office costs
- -unexpected costs

Item	Cost (€)
Raw material and packaging	750,000
Production employees' wages	70,000
Office personnel's wages	30,000
Energy and installations	10,000
Maintenance	7,500
Unexpected costs	45,000
Depreciation	16,000
Office costs	8,000
Total	936,500

Table 22 Production costs

- Raw materials

The costs of raw materials for production is presented in table below:

Item	Unit	Annual consumption	Unit cost(€)	Total cost(€)
Super absorbent powder	Kg	7,500	8	60,000
Polyester net	Square meter	300,000	1.5	450,000
PVC powder	Ton	240	1,100	264,000
Plastic bonds	Piece	900,000	0.25	225,000
Total	-	-	-	999,000

Table 23 the annual raw materials costs

-wages

Generally, the success or failure of a production unit highly depends on its employees' expertise and their ability to adopt to the company's culture and visions. In the case of adjusting personal values with the company's vision the result would be more co-operating and productivity otherwise the employees would lose their motivation and team spirit. As a result, the factor of human resources highly affects the company's success. There are several elements related to estimate the needed human resources like the complexity of technology, the intention to entrepreneurship and the level of expertise needed.

In this project the human resources are categorized in office personnel, direct and indirect production labor. Based on the human resources estimation, the wages of these three groups are presented below. In financial estimations, wages are calculated with considering bonuses and insurance.

- Direct production labor wages

This category Includes all the workers and experts who are related to the production line and have a direct role in production process. The detailed wages are presented in table below.

Item	Persons	Monthly wage(€)	Annual wage(€)	Total(€)
Skilled worker	3	350	4,200	12,600
Unskilled worker	6	250	3,000	18,000
Laboratory	1	400	4,800	4,800
total				35,400
bonuses and insurance (100%)				35,400
Total				70,800

Table 24 Production labor wages

- Office personnel wages

The detailed wages of office personnel are presented in table below.

Item	Persons	Monthly wage(€)	Annual wage(€)	Total(€)
CEO	1	700	8,400	8,400
Finance	1	380	4,560	4,560
Merchandising	1	380	4,560	4,560
Services	1	250	3,000	3,000
Total				20,520
Bonuses and insurance (70%)				14,364
Total				34,884

Table 25 office personnel wages

- Energy consumption costs

The costs of energy consumption like gas, electricity, water, etc. are presented in table below.

Item	Unit	Annual Consumption	Unit cost	Annual cost
Electricity	KWH	144,000	0.05	7,200
Water	Cubic meter	900	0.25	225
Gas	Cubic meter	51,000	0.5	2,550
Fuel	Liter	3,000	0.6	1,800
Telephone	-	-	-	200
total				11,975

Table 26 annual energy consumption costs

- Maintenance costs

Repairing and maintenance costs are presented in table below.

Item	Annual cost
Buildings and landscaping maintenance	2,350
Installations maintenance	1,100
Transportation facilities maintenance	200
Machinery maintenance	3,500
Office equipment maintenance	100
Total	7,250

Table 27 annual maintenance costs

- The costs of sale and distribution

The costs of sales and distribution are considered for 1% of the maximum estimation of sales which would be 10,500 (€).

- The cost of assets depreciation

The depreciation cost of the assets based on a percentage (around 6%) of their whole value is calculated and equals to approximately 16,000 (€).

- Unexpected expenses

Some unexpected expenses like fluctuation in prices and some other unpredictable costs which occur in operating phase, would be covered for about 5% of production costs equals 45,000 (€) considered for this issue apart from depreciation and other costs.

15) Fixed and variable costs

Fixed costs are the costs like office personnel wages that the level of production and activity of the plant does not affect them while variable costs are those costs which change according to the production level and activity. The higher the activity level and production of the company the more the variable costs. In this part, all the expenses are defined based on their nature of being fixed or variable and also taking into account the percentage of the cost compared to the whole. The details of these cost are presented in table below.

Item	Variable cost (%)	Variable cost (amount)	Fixed cost (%)	Fixed cost (amount)	Total cost (€)
Raw material and packaging	100	750,000	0	0	750,000
Production personnel wages	30	21,240	70	49,560	70,800
Office personnel wages	0	0	100	34,884	34,884
Energy consumption	80	9,580	20	2,395	11,975
Maintenance	80	5,800	20	1,450	7,250
depreciation	0	0	100	16,000	16,000
Unexpected costs	40	18,000	60	27,000	45,000
Costs of sale and distribution	100	10,500	0	0	10,500
Total	-	815,120	-	131,289	946,409

Table 28 fixed and variable costs

16) Unit cost of the product

The unit cost is determined by calculating the total cost (the fixed cost and variable costs) and then dividing the total cost by the total number of products produced. The unit cost of the product is presented in table below.

Item	Unit	Unit cost (€)
Modern plastic frames	Piece	6.3

Table 29 the unit cost of the product

17) Break-even point

- A crucial factor which determines the point where total revenues equals total costs, both fixed and variable. To start finding this point, contribution margin should be calculated. Then the break-even point could be determined.

Contribution margin = Sales – variable costs

Contribution margin = (150,000) (7) – (815,120) = 234,880 (€)

Break-even units = Fixed costs / contribution margin per unit = 131,289 / 1.56 = 84,159 (units)

Break-even revenues = 589,113 (€)

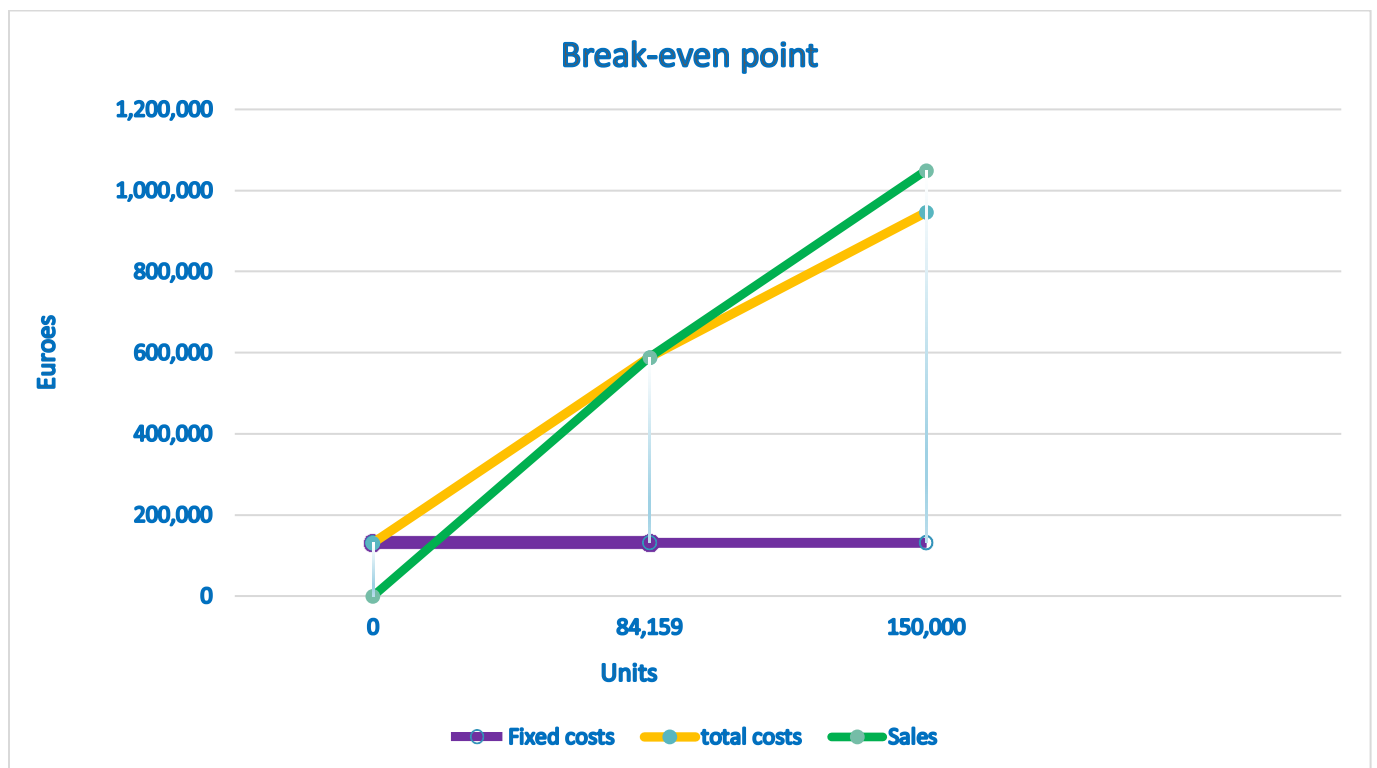


Figure 23 break-even point

Source: created to illustrate the current discussion

Item	Amount
Total fixed investment	274,170
Working capital	160,000
Total project investment	434,170
Annual revenue	1,050,000
Total production costs	936,500
Net annual income	113,500
Break-even point percentage	56.1 %

Table 30 Project indicators

Part 5: Results and conclusion

Based on the discussions regarding the concept of innovation mostly in part 2 of this thesis, the category of the mentioned innovation (modern plastic frames for water-based air conditioning systems by substituting super absorbent powder instead of wooden straw) would find its place in **innovation as an outcome** as the main category at first, then identified as **product innovation** as its sub-category.

As discussed in details in prior parts, the concept of this innovation is not about something fundamentally new and unknown for the public and the product's consumers, only benefiting from a modern substance and substituting old-fashioned wooden straw with this product which leads to solving a range of problems the consumers face in their experience with air-conditioning systems including hygienic aspects, life cycle, energy and water consumption, environmental issues, etc. the basics of the product and its functions remains the same, so as its appearance and outline. Hereby, coming back to the meaning of product innovation would be more helpful. The shortest definition is "new ways for old needs" and in other words it would be changes in the products and services offered to improve and promote them. As a result, in this project the product and its function remains unchanged but its efficiency is highly increased and most of the problems and usage difficulties would be disappeared. So the current innovation would lie in **product innovation** category.

Concerning the different innovations' generations, it seems this case would belong to second generation of innovations. In this category, the main source of innovation does not come from mere science and laboratories. Actually, in this category, the innovation originates from outside, which would be most importantly market and consumers. Market itself and customers' needs would not be constantly stable and dynamism of market and new desires and needs would create the great need for innovations to satisfy them. In this case, a wide range of problems which consumers face with their air-conditioning systems creates the need for a substitute product to respond to this great demand because of great number of users of this product at current market (17 millions of

users). So as a result, this innovation seems to answer to the market need and would place in second generation of innovations.

Regarding most famous innovation theories which discussed in details mostly in part 2, in this case the innovation would be "disruptive innovation". Disruptive innovation based on prior discussions is a kind which are all about upgrading current products in the market. The whole process is about initially entering the market and after a period of time disrupt the market and replace the current products and networks and demands with the new technology. The cause of this phenomenon would be increasing the customers and market's satisfaction by improving the quality and efficiency of the current products by introducing a new innovation. So regarding this case, solving different problems of consumers and increasing the product efficiency in terms of energy and water consumption and hygienic aspects, it seems reasonable to categorize this case in "**disruptive innovation**" section.

Another important factor in this field which was discussed in this thesis is about customers' values about products. In terms of personal and cultural values it seems there would be no obstacle on the way because of having no conflict with personal and cultural values and offering almost the same product which is offered to the market and has been known to the customers for a very long time. It seems the more important field would be customers' values and product values. Customer value represents the classic "value for money" concept which impacts customer satisfaction and loyalty. Again about this issue it doesn't seem a problem. Based on the great advantages this product possess in comparison to the traditional product and also the price which is almost the same, not only the customer value would not be a problem but also a noticeable strength. Nearly same story goes for product values. The product value is about customer judgment and choosing between different alternatives in the market. The factor which plays a key role in this area would be the product's competitive advantage. Based on the characteristics and advantages of the new innovative product the process of judgment of the customer and deciding to choose between the traditional one and the new one would be much easier and it could be anticipated that the product value for ordinary customers would be much higher in comparison to the traditional one and the deciding and choosing phase would not be much difficult except only for highly traditional-oriented customers who are willing to use the same product which will be more discussed in below and some ideas to attract these group of customers will be proposed.

Concerning the different classes of customers, almost 50% of customers are reluctant to innovative and new products (%34 late majority and %16 laggards). These people are not so open to innovations and have a tendency to more traditional products which they are more familiar with and have experienced them before. Only %15 of customers (early adaptors and innovators) are highly open to innovations and %34 (early majority) are somewhere in between with a tendency to the traditional products but not very much. Although our innovation case is not fundamentally new and unknown only a highly improved version of the old one and also very similar in terms of appearance and shape, but it seems reasonable to propose some ideas to maximize the probability of being accepted by the traditional-oriented consumers. For instance, the dimensions and shape of the product could be designed as similar as possible to the traditional versions so the customers would not get the feeling of facing a totally unknown and new product and also in terms of packaging (which is far better in quality compared to the old ones) some comparison to the old product could be shown visually so when any customer lies eye on the product, it could be understood that this is the same product not something totally new and not applicable for his /her current machine. Besides for the group of the customers who undoubtedly would be unsure about quality and capabilities of the product in the moment of purchasing it is planned to consider a 5 year unconditional guarantee for the product function.

As mentioned in part 3 of this thesis, two market surveys have been conducted by the author to estimate the popularity and importance of customers problems regarding water-based air conditioner systems. Based on the results of these surveys %87 of the participants are using water-based air conditioning systems currently. The most priority of their most crucial problems and difficulties were firstly air pollution and dust entering internal rooms (%45) then maintenance and renewing issues (%18) and after that water and electricity consumption. %72 of consumers believed that the life-cycle of the traditional product is too short and have difficulties in changing them every year. Around %72 expressed their satisfaction level of the product as "too low" and %86 were willing to replace their product with a better option if there was any for the next year and %61 were ready to replace it with a better one immediately. The most important factor for them to give a new product a try would be firstly price and maintenance cost (%46) then their most annoying problem expressed in second item of survey number 2, after that water and energy consumption. Concerning the amount of money which they are willing to pay in case of introducing a better

substitute %51 were willing to pay the same price and %44 higher up to %50. These findings are extremely important and helpful to have a more accurate view of real customers and the market. Based on these results it is justifiable that dissatisfaction level is high and the potential level of offering a better product is considerable. In terms of marketing and emphasizing the advantages for example on the package the air-cleaning feature and longer life-cycle are more important issues to mention and emphasize. Regarding the profit margin and selling price it seems better to put a price the same as or close enough to the traditional one's price and not more than %50 higher, which therefore it is decided to put the same price (7 euros) compared to the current traditional product in the market at the introducing phase.

Concerning marketing, since the business plan is planned to be proposed for a bank loan, the focus is on the financial details so marketing plans are not mentioned. Actually, the final decision in this part is running a trial mode and a pre-release phase before presenting the product broadly and in great scales. In fact, agreements have been reached with some local stores which are active in selling and distributing air conditioning systems and related equipment to present this product for a short period of time. The purpose of this plan is to get the feedbacks from real customers about different aspects of the product including the price, packaging and totally their opinion about the product. More importantly, the after-sale issues would get more clear by this plan and we could be aware of probable problems of the product if there was any. The great advantage of this idea is making sure of any weak point or problem before presenting the product in great scales like in chain stores and reducing the risk of failure of the project in this way. After this step, the decision for marketing is based on indirect distribution channel strategy. The plan is conducting contracts with wholesalers, retailers and chain stores so reaching the product to consumer would be through distribution channels. The cause of this decision originates from the product itself. Being a new comer to the market and not being known for the customers is a threat for direct selling through the website or so on. Although this part does not end in this phase and there would be more marketing plans. Benefitting from one of the trends in marketing in Iran would be one of them which is social video marketing. Because of the considerable proportion and popularity of social medias in Iran it has been a trend very recently. Although it will not be prime marketing strategy at beginning phase and financial sources has not been dedicated for that in business plan.

In terms of financial aspects of the manufacturing plant of the mentioned innovation, as discussed in details in part 4 of this thesis (business plan), eventually, the project indicators are showing 434,170 for total project investment, 1,050,000 for annual revenue and 113,500 for Net annual income. The decision of putting 7 euros for the price was a challenging issue because of lowering the revenues of the company but the ultimate decision was not taking much risks in initial and introducing phase and acting safe in beginning years until capturing considerable market share would be the prime strategy. In spite of these assumptions, the project indicators seem reasonable to launch the project.

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