# INTERNATIONAL HELLENIC UNIVERSITY

# 3D puzzles of Thessaloniki Landmarks: Introducing a new line of souvenirs for the city

**Michailidou Despoina**

**Moisidou Isaia**

**SCHOOL OF ECONOMICS, BUSINESS ADMINISTRATION & LEGAL STUDIES**

A thesis submitted for the degree of

*Master of Science (MSc) in Strategic Product Design*

February 2016

Thessaloniki – Greece

| Student Name: | Michailidou Despoina , Moisidou Isaia |
|---|---|
| SID: | 1106140010, 1106140011 |
| Supervisor: | Symeonidou Ioanna |

*We hereby declare that the work submitted is ours and that where we have made use of another's work, we have attributed the source(s) according to the Regulations set in the Student's Handbook.*

February 2016

Thessaloniki - Greece

**Abstract**

This thesis introduces a problematic about the lack of quality souvenirs in the city of Thessaloniki, researches and analyses existing products and proposes a new line of 3D puzzles of the monuments of the city. Through literature review on the topic of tourism and souvenirs as well as the underlying logic in puzzles, combined with technical knowledge on joinery and connections the authors summarize the the current state of the art and aim to combine these fields in the elaboration of a design proposal. The methodology followed is market research and the study of consumer behavior through questionnaires. The analysis of the obtained data leads to meaningful conclusions about the tourist preferences and aids the authors in the elaboration of a design brief. The authors examine two case studies of similar products in order to identify the positive and negative characteristics, discuss their functionality, aesthetics and materiality and therefore take meaningful decisions about their design proposal. The knowledge gained through the above mentioned research methods leads to the design proposal, which is documented in detail. The design process departs from moodboards and the study of current manufacturing technologies in order to propose a product that combines a high aesthetic value with the construction workflow that is compatible with new technologies. Several phases of design explorations lead to the actual product design, which the authors also constructed physically at the university lab. As the product is to be assembled from 2D parts into a 3D model, the authors placed particular emphasis on the disassembly and packaging of the object, proposing a packaging solution that follows similar aesthetic criteria coupled with functionality concerns and environmental sustainability.

Keywords: product design, Thessaloniki monuments, architectural models, souvenir line, digital fabrication

Michailidou Despoina

Moisidou Isaia

**PREFACE**

This dissertation was written as part of the MSc in Strategic Product Design at the International Hellenic University. Over the years, the word souvenir has obtained a negative meaning, as it usually refers to mass produced low cost and low quality objects. Our main aim is to change this perception of souvenirs, and design a series of objects of high artistic value. For that reason, the project introduces a series of Architectural Models in the form of 3D puzzles, to be included as an exclusive souvenir line at Museums of Thessaloniki. After identifying and collecting all the necessary information about the city of Thessaloniki and its monuments, but also about the needs that potential tourists have when they visit a city for the first time, the team proposed a fresh new line of souvenirs that will be characterized by minimal design and at the same time will educate the visitors about the city's architectural and cultural heritage.

# Contents

**Introduction**

Tourism is among the most significant sectors in global economy, and it is particularly vital in countries with rich cultural heritage. It is "an efficient tool with which to promote economic growth" (Jimenez and Ortuno, 2006) and "an important factor in the productivity of a national economy" (Dritsakis, 2004). According to H. Dogan (1989) it has also been a major source of intercultural contact between people who travel abroad and it has influenced the socio cultural structures of most touristic cities. Especially for countries sharing the same characteristics as Greece, the meaning of tourism is important not only for the strengthening of the economy, but also for the spread of all the customs and traditions that passed down through the decades. By travelling, tourists are able to share a part of the everyday life of local people in a short period of time, witness significant moments of the country's history and entertain themselves with a variety of exciting activities. At the end of their visit, in order to remember all the interesting places that they visited and the special moments and events that they experienced, they purchase postcards, magnets or local products for themselves and their families as mementoes of a good time.

The meaning of these souvenirs is valuable for both the tourists and local people. The former are able to associate them with their journey and learn about a particular place and its history and the latter use them as an excellent way to promote their country and all the characteristics that make it unique and the perfect destination for tourists. As the souvenir travels, it becomes in itself an extension of all the qualities that the country where it comes from, stands for. As Gordon B. (1989) states, as artifacts saved as reminders of a particular reality, souvenirs have a great deal to tell us about the way that reality in another place was experienced.

Thessaloniki is a popular tourist destination and is regarded as an interesting and exciting place to visit throughout the year. It is a mid-sized European city that can offer the tourist a great number of sights from different decades and is also mentioned as a hospitable place where the visitor can amuse himself and enjoy his stay. However, despite all the efforts made in the last years, a significant lack of interesting and modern souvenirs suiting the richness of the city has been recorded. In spite of the existence of young designers with new and original ideas, tourists can only purchase souvenirs whose design is old-fashioned and obsolete.

The purpose of this dissertation is to identify and collect different types of data about the city and the monuments, the existing souvenirs and a juxtaposition of their shortcomings and the needs that tourists have when they visit a city. The aim is to design and introduce a new line of souvenirs for the city of Thessaloniki that will be elegant and at the same time informative about the history of the city. As our idea is to design a series of 3D puzzles of iconic monuments of the city, we depart from researching puzzles as well as their construction logic through the literature review that follows.

## Literature review

### *Puzzles*

A puzzle is a game that tests a person's knowledge and ingenuity. In order to complete a puzzle the player needs to put all the pieces in such a logical way that will help him to arrive at a correct solution of the problem.  A puzzle can be a form of entertainment but also a good way to sharpen one's mind. As a challenging and educational game, a puzzle can stimulate curiosity in both adults and children through feedback.  According to wikipedia the first documentation of the word "puzzle" was made around 1594-95 in a book titled The Voyage of Robert Dudley and at the end of the same decade it was mentioned in the 1898 the edition of the Oxford English Dictionary as a verb.

*"A puzzle is fun and it has a right answer"*

According to Scott K., a famous puzzle designer, these are two significant elements that a puzzle should have. The definition that he gave consists of two parts. The first states that a puzzle is a form of play, and play always starts with a twist of familiar and everyday things. A good puzzle needs to be neither too easy nor too difficult for the player to solve, in order to keep his interest alive. As for the second part of the definition, the design of the puzzle should always have one or more correct answers in order to attract different types of players. The designer came to the conclusion that the only way to create a good puzzle, is to first build a good toy.

Another notable game designer, called Kevin Maroney, mentions in his book "The art of Computer Game Design" a scale of four types of play activities including puzzles. As reported in that list, games are   rule - based systems in which the aim is for only one player to win. Puzzles are second on the list and are similar to games, but the goal is to find a solution in order to complete the activity, and not to be the winner of it. The other two activities that follow are toys and stories.

Picture 1: a hierarchy of four types of play activities including puzzle

## *2D puzzles*

There are two main categories of puzzles, the 2- dimensional and the 3- dimensional puzzles. The 2-dimensional puzzles are older and more common in the toy market and include several types. The most well-known 2D puzzle, and one of the first games that children prefer, is the jigsaw puzzle. It is a tiling puzzle that requires from the player to assembly different and oddly shaped pieces together in order to create a complete picture. The process that is followed to design this particular kind of puzzle is by painting a whole image on a large flat piece of wood which is later cut in many irregular pieces with a jigsaw hence the name of it. All these pieces are to be re - assembled in order to form the whole picture.

One subcategory of this type of puzzle is the digital jigsaw puzzle which nowadays is extremely popular because of the increased use of technology.  A well designed digital puzzle may draw immediate attention to the player's mistakes facilitating self- evaluation more quickly than the traditional approaches. As Andersen and Ahdell state in their Master thesis (2002), a well - designed game should always provide players with a recognition pattern. In a digital jigsaw puzzle the pattern is defined as a precise structure through which a context is presented. In that way the players are able to ask critical questions based on all the available information which in that case are the puzzle pieces. These questions lead to the completion of the puzzle and sharpen the players' awareness of detail. In the article called "Computers in Human Behavior" the writers introduce some advantages of the digital jigsaw puzzles over the traditional physical puzzles. To begin with, pieces and patterns of this type of puzzles are easier to be created because of the computer programs that are available. Secondly, their degree of difficulty is

easy to increase, thereby making it more complex and challenging for the players and their abilities.



Picture 2: Jigsaw puzzle

Another interesting 2D puzzle is the mathematical puzzle which makes up an integral part of recreational mathematics. It has specific rules as do multiplayer video games, but usually lacking the competition between two or more players. Instead, to solve such a puzzle, the solver must come up with a solution that meets the given statements. Mathematical puzzles demand mathematics to solve them. Logic puzzles are an ordinary type of mathematical puzzle.

The logic puzzle was produced by Charles Lutwidge Dodgson, who is better known under the name, Lewis Carroll, the author of *Alice's Adventures in Wonderland*. In his book *The Game of Logic,* he introduced a game that showed how to solve problems such as corroborating the conclusion "Some greyhounds are not fat" from the statements "No fat creatures run well" and "Some greyhounds run fast". Such puzzles, where we are given a list of assumptions and asked what can be concluded from them, are known as syllogisms. Another form of logic puzzle, popular among puzzle enthusiasts, and available in magazines devoted to the subject, is a format in which the set-up to a scenario is given, as well as the objective, certain hints are given and then the reader fills out a matrix with the clues and trail to derive the solution.

These are often referred to as "logic grid" puzzles. The most famous example may be the Zebra Puzzle. Common in logic puzzle magazines are derivatives of the logic grid puzzle called "table puzzles" that are assumed in the same manner as grid puzzles.



Picture 3: Logic puzzle

Spot - the - difference is a type of logic puzzle where players must find a set number of differences between two otherwise same images, whether they are illustrations or photographs that have been modified with photo manipulation. Spot the difference games are also known as ''photo hunting'' games, and are commonly found in activity books for children. The solution to the puzzle is often nearby or in an accompanying answer page of a puzzle book. Additionally, one can cross one's eyes and unify the two pictures into one, in much the identical way as when viewing an auto stereogram picture. The differences will come out to flutter in and out of one's vision. This is a very efficient method of solving these puzzles.

Picture 4: Spot the difference puzzle

A cross-figure is a form of puzzle which is similar to a crossword, but the entries are consisted of numbers instead of words, and individual figures are entered in the unfilled cells. It is possible to clue the figures in a number of ways:

- The clue can help the solver to come up with the required number directly, by using common knowledge or numbers or some other mathematical facts

- The clue may predicate the application of arithmetic to another answer or answers

- The clue can point out to certain possible answers yet make it hard to find the correct answer without the use of crosslights, which are a prime number

- A specific answer can fetch a relation to another one in a unique way

- It may be so a number of the entries are not even clued at all; they will even purpose towards another riddle

- Different entries may also be assembled along to make clues

- Certain cross-figures use a clue of Associate in Nursing algebraical character wherever completely different alphabetical letters signify unknown values

- Another distinctive kind of puzzle uses real-life things sort of a family or cluster excursion and formulate most of the clues on this

Cross-figures that mainly use the primary class of clues area unit sometimes used for academic reasons. However, most puzzle enthusiasts can accord that this manner of clue ought to be used only most sparingly, if at all. Without this type of clue it might seem unfeasible on a superficial level to solve a cross-figure, as no evident answer can be completed as long as another had been first found, which seems unachievable without gaining the first form of clue. Nevertheless, if one takes a different method and instead of seeking to find out complete answers one firmly decreases down the possibilities for individual cells or whole answers in specific cases, then the question becomes easily soluble. Another significant point of you of cross-figures is no 2 answers should be identical. An absorbing element of the cross-figures is that it is quite logical for the puzzle setter to wage solving the puzzle him or herself. In fact the puzzle setter should perfectly try to do this without relating directly to the answer as this is the single feasible way for discovering if the cross-figure puzzle has one single unique solution. On the other hand, there are also various computer programs disposable which can be utilized to accomplish this function. However, these programs may not actually make explicit the demanding level of the puzzle. In spite of the fact that some key mathematical information is needed for fathoming cross-figure puzzles, those ubiquity about them is short of what that from claiming crosswords. It may be because of this, that not many books bring really secured them. A magazine named math Puzzles Furthermore rationale issues will be distributed by dell Magazines 6 times a quite a year. It incorporates around a dozen for cross-figure puzzles which they entitle likewise "Figure Logics". It will be likewise because of those low ubiquity level for cross-figures that it it has lesser established conventions when compared to crosswords.
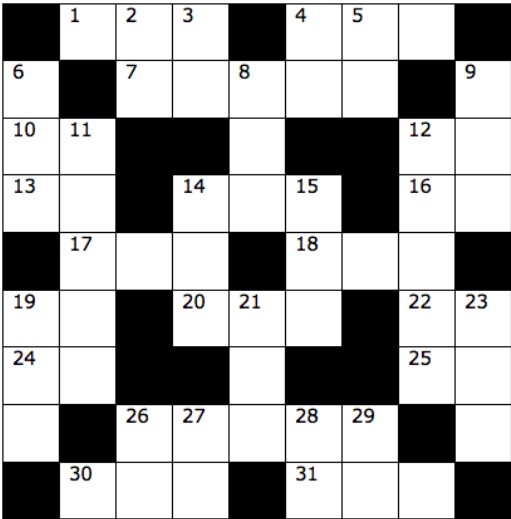


Picture 5.: cross figure puzzle or crossword

A mechanical puzzle is a 2d puzzle introduced likewise a situated of mechanically interlinked pieces. The oldest recognised mechanical puzzle originates from Greece and showed up in the 3rd century BC.The game comprises of a square partitioned under 14 parts, and the point was to make diverse shapes from these pieces.

Mechanical puzzles square measure divided into categories:

-Assembly puzzles: In this genre, the puzzle is introduced in part form, and the point for the player is to prepare a specific shape. The soma 3d shape constructed by Piet Hein, the Pentomino  by Solomon Golomb  and the previously stated establishing puzzles tangram and "Anker-puzzles" are  all examples of this category of puzzle.  Moreover, issues in which an amount of pieces should be regulated so as to match into a box are also classed in this type.

-Disassembly puzzles: The puzzles in this class would typically illuminated by opening or separating them under pieces. In this classification would incorporated puzzles with hidden opening mechanisms, which are to be opened toward experimentation. Furthermore, puzzles consisting of metal pieces joined together in some way are also considered as part of this category. Boxes known as secret boxes or puzzle boxes with mystical opening components are extremely popular in Japan and are considered as disassembly puzzles. They generally include more or less complex, commonly unobservable opening mechanisms which uncover a little hollow space for opening.

-Interlocking puzzles: In an interlocking puzzle, one or more pieces are those that retain the rest along, or the items are commonly self-sustaining. The aim of interlocking puzzle is to thoroughly disassemble and then set it together. Notorious examples of these are the Chinese wood cruxes.

Both assembly and disassembly might be demanding – opposed to assembly puzzles, these puzzles ordinarily do not just separate easily. The level of arduousness is usually estimated in terms of the number of moves demanded to ward off the first piece from the primary puzzle. The first time that these puzzles were reported arrives back to the beginning of the 18th century. More specific, in 1803 a catalog by "Bastelmeier" included two different puzzles of this category. A reference of two different categories of interlocking puzzles is also stated in professor's Hoffman (1997) book called "Puzzles old and new". At the beginning of the 19th century the Japanese undertook the market for these puzzles. They evolved a large number

of games in all types of different shapes – animals, houses and other objects - whereas the deployment in the western world rotated mostly around geometrical forms. With the aid of computers, it has recently got capable to analyze complete sets of games played.

-Fold puzzles: The purpose during this specific kind of puzzles is to fold a printed piece of paper in a way that it becomes a target image.
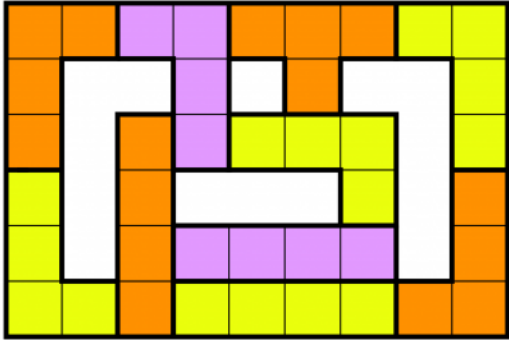


Picture 6: Assembly puzzle
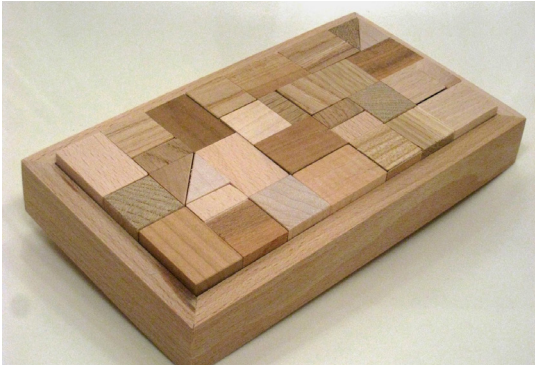


Picture 7: Interlocking puzzle

### 3D puzzle

A disentanglement puzzle may be a variety of mechanical puzzle that involves disentangling one piece or set of items from another piece or set of items. The reverse downside of reassembling the puzzle may be as exhausting as—or even tougher than—disentanglement. There are many completely different varieties of extrication puzzles, those one puzzle could incorporate many of those options. the primary kind is that the plate and ring puzzles that incorporates one plate or similar displaying several holes and/or indentations and a closed or nearly closed ring or an analogous item. The plate moreover because the ring is sometimes made up of metal. The ring should be disentangled from the plate. The second is that the wire puzzles that incorporates 2 or additional entangled items of additional or less stiff wire. The items could or might not be closed loops. The closed items could be straightforward rings or have additional advanced shapes. Normally, the puzzle should be solved by disentangling the 2 items while not bending or cutting the wires. Early wire puzzles were made up of horseshoes and similar material. The last kind is that the wire and string puzzles that incorporates one piece of string, ribbon or similar, which can type a closed-loop system or which can produce other items like balls mounted to its finish, one or many items of stiff wire, and typically further items like picket balls through that the string is rib.

Picture 8: Early wire puzzle

A burr puzzle is wide thought of to be the world's popular toy and a 3D interlocking puzzle consisting of notched sticks, combined to create one three-dimensional, typically symmetrical unit. These puzzles square measure historically made from wood, however versions made from plastic or metal can even be found. Quality burr puzzles square measure typically precision-made for simple slippery and correct fitting of the items. In recent years the definition of "burr" is increasing, as puzzle designers use this name for puzzles not essentially of stock-based items.

Rubik's Cube may be a 3-D combination puzzle made-up in 1974 by Hungarian sculptor and faculty member of design Ernő Rubik. Originally referred to as the Magic Cube, the puzzle was authorized by Rubik to be oversubscribed by Ideal Toy house in 1980 via bourgeois Tibor Laczi and 7 cities founder Tom Kremer and won the German Game of the Year special award for Best Puzzle that year. By the tip of January 2009, 350 million cubes had been oversubscribed worldwide creating it the world's top-selling puzzle game.

In a classic Rubik's Cube, every of the six faces is roofed by 9 stickers, every of 1 of six solid colors: white, red, blue, orange, green, and yellow. In presently oversubscribed models, white is opposite yellow, blue is opposite inexperienced, and orange is opposite red, and therefore the red, white and blue square measure organized therein order in an exceedingly right-handed arrangement. On early cubes, the location of the colours varied from cube to cube. an enclosed pivot mechanism permits every face to show severally, so combining up the colours. For the puzzle to be solved , every face should be came back to possess only 1 color. Similar puzzles have currently been made with varied numbers of sides, dimensions, and stickers, not all of them by Rubik.

Tangram may be a dissection puzzle. It consists of seven items, referred to as tans, that work along to make a form of some type.the target is to make a particular form with seven items. the form has got to contain all the items, which can not overlap.


Picture 9:Burr puzzle
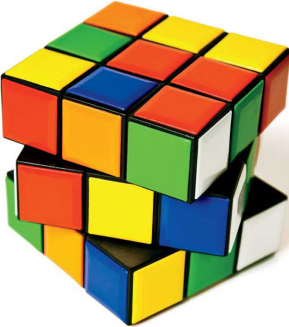

Picture 10:Rubik's cube
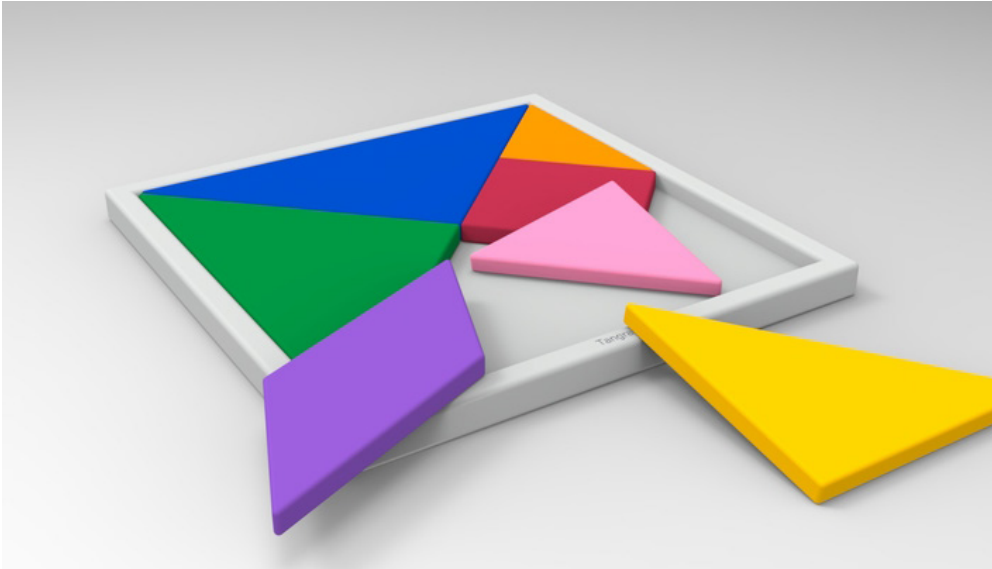

Picture 11: Tangram

### *Japanese joinery*

A very important technique in order to have a successful puzzle and more specifically, a 3D puzzle is the joinery between the different pieces of the puzzle. Specifically, the connection methods of the interlocking 3D puzzles have contributed in designing smooth joints in order to have a smooth overflow of puzzles' materials without using fastenings or adhesive additional materials. The function and the design of each piece are the starting points for the joinery choice. According to Anthony Guidice, a strong and functional joinery depends on two things: knowing which joint to use and how to make it.

The most known joinery method is the Japanese as it was being developed for many years through the Japanese architecture and constructions. The majority of the Japanese joints are designed for wood structures.

According to Torashichi Sumiyoshi and Gengo Matsui, joints are divided into two main categories: the splicing joints and the connecting joints.
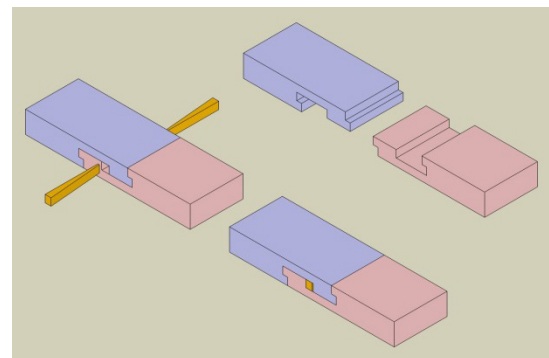
Splice joints

A splice joint is a method of joining two pieces end - to - end or by butting them together. There are four main types of splice joint. The first type is the stepped dovetailed splice which is a simple splice joint, where the ends of the two half pieces have notches in order to be connected. The one piece is hollowed out to fit with the other piece which is cut to the hollow shape.

The second type is the rabbeted oblique scarf splice in which the two ends of the joints are identical and referred to as the upper wood and the lower wood. Two mortises are deepened through the depth of the splice for inserting draw pins. The joint is assembled by sliding the internal face of the upper wood over the internal face of the lower wood, keeping the surfaces of the middle drops in close contact. The pieces are then pressed together and secured by pounding in two draw pins, effectively interlocking the front and back surfaces of the joint.
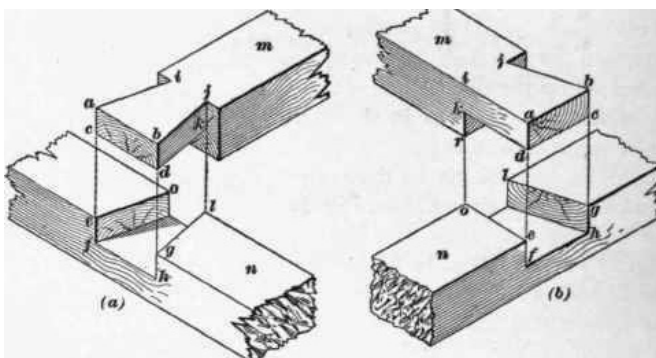


Picture 12: Stepped dovetailed splice          Pic.ture 13: Rabbeted oblique scarf splice
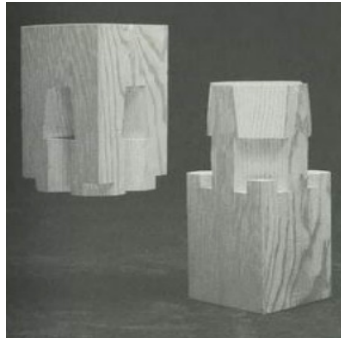
The third one is the tenon and mortise splices which are divided into cross-shaped, right angle housed and blind tenon and mortise splices. The difference between those is the different shapes of the hollows. The last type is the column splices, which are divided into four faces; gooseneck, in which two goosenecks are carved diagonally across the section; the clam-shaped

splice, which is usually reserved for splicing distinguished elements such as the central column in a pagoda; and the blind splice, in which a key contributes little to the sturdiness of the assembly compared to a draw pin. The key hole and the longitudinal joint line are positioned at the corner of the section making this splice very attractive on columns.
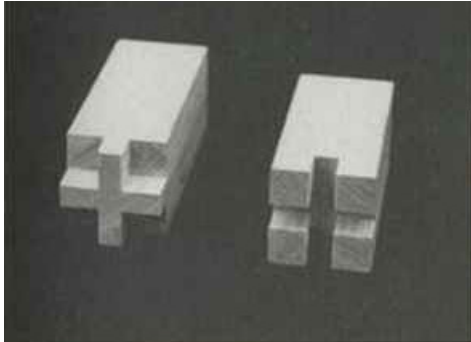


Pic.ture 14: Tenon and mortise splices        Picture 15: Column splices

Connecting joints

The connecting joints are the joints through different shaped parts. There are two types of these joints that can be used in simpler structures. The first type is the half dovetailed joint in which the model depicts a wall tie connecting into a corner column. The column was split lengthwise to reveal the internal locking mechanism. The second type is the wedging joint which connects columns with ground sills,girders, girts e.t.c.. In the model, the column was split in half lengthwise to reveal the internal locking system. The joint is simply assembled by inserting the tenon into the mortise. Two wedges are pounded in the tenon, splitting it open and locking it against the mortise.
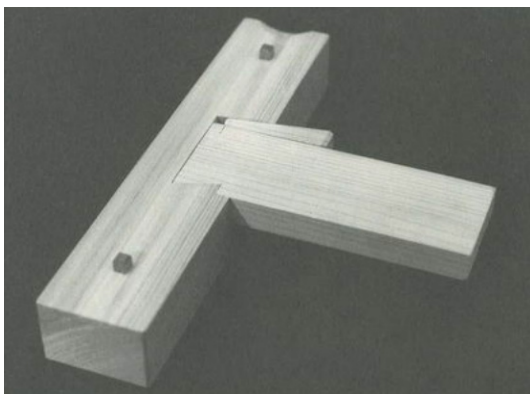


Picture 16: Half dovetailed joint        Picture. 17: Wedging joint
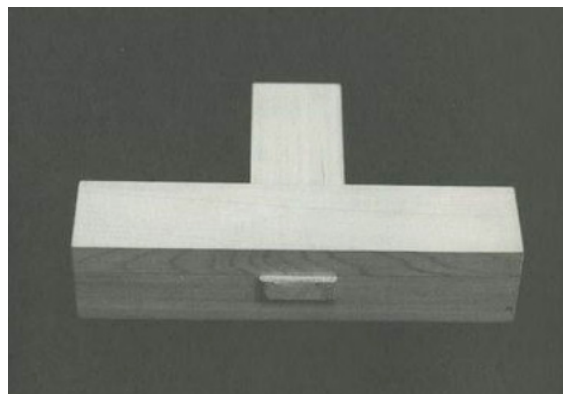
***Tourism and souvenirs***

According to The Greek Tourism Confederation (SETE) 2012 Facts, which is shown in Table 1 , Greek tourism contribution in the national GDP is 16.4% and its  contribution in employment is 18.3%. Despite the political instability in Greece, which resulted in a big decline of the visitation in recent years, the figures for 2013 are really encouraging. This happens because of the instability in neighbor competitor countries such as Turkey, Egypt, and Tunis and the decline of prices. As Valene Smith claims, tourist is a temporarily leisured person who visits a different place away from his home in order to experience a change in his everyday routine. Other theories mention tourism as a way of bringing people from different countries and diverse cultures together. Although this theory is widespread, there is evidence which shows the opposite. As J. Laxson mentions on his study (1991) ideas and stereotypes act as blinkers and prevent the tourists from learning in their travels. Drawing from the study, he claims that, US tourists who visited museums of native American culture seem to be convinced from brief encounters of the correctness of their own views of the world despite the encouraging of cultural understanding.

Table 1: Greek tourism basic figures 2012
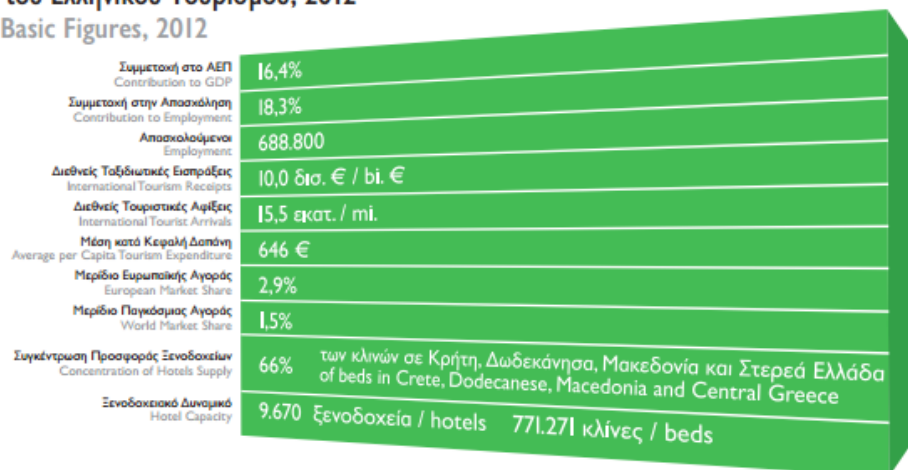


There are various types of tourism such as religious, ecotourism, medical and sustainable tourism. The last one is supposed to be very popular and therefore many countries already make plans and set the base for developing that kind of tourism. Based on the article "International Journal of Contemporary Hospitality Management", other countries as a result of former political regimes or lack of resources, are trying to direct their efforts towards more

environmentally friendly projects and ecotourism. Despite the difficulties that Greece is facing, which are the worst ones since the previous economic crisis of WWII, the investments in this domain are continuously developing. Greece is one of the most popular holiday destinations in Europe with a number of 15 million tourists choosing our country for their vacation every year. The competitive advantages of Greece, such as rich cultural heritage, natural beauty and geographical variety, have been significant reasons for the development of tourism. To start with, Greece offers an unlimited variety of attractive destinations for year-round holidays starting with the multitude of sunny islands and beaches, to the snowy peaks and forests. Moreover, it has a long history and cultural heritage, which can unfold in front of the tourists' eyes once they visit all the museums that are located in different cities around the country.

Specifically the city of Thessaloniki, although it is not the typical sea&sun Greek destination, is the second largest city in terms of population and the fifth in Balkans, and is totally connected with tourism. Moreover, it has a lot of characteristics that are interesting and ideal for urban tourism. Because of its unique geographical position, the city is home to of one of the biggest ports in the Mediterranean Sea with a total annual traffic capacity of 16 million tones. With a unique history background of more than 2300 years and a great variety of remains from different civilizations, Thessaloniki is a popular city that hosts a great variety of remains from different ancient civilizations combined with a unique mosaic of modern civilization residents and religions (Jewish, Turks, Bulgarians, Greeks). These characteristics are enough to create a set of different but joint tales that can describe the city's sense as a unique crossroads of people and history. It is not a coincidence that the city was listed by the New York Times published on their website in January 7, 2016, as one of the Top 52 Destinations for 2016.

The tourism industry designates tourism souvenirs as a product which is associated with a particular location, often including geographical information. Most of these products are also claimed to be good for souvenir collectors. The souvenir trade is an important part of the tourism industry and serves a double role; first, to help improve the local economy, and second, to allow visitors to take with them a reminder of their visit, in order to increase the chance of a second visit. Although the industry of souvenirs is constantly developing, in Greece and especially in Thessaloniki, there is a lack of interesting and unique souvenirs, thus the amount of tourists who buy souvenirs from the city is gradually reducing. There are various

options for the different monuments of Thessaloniki such as postcards, miniatures or objects with printed pictures  (t-shirts, bags, magnets). Despite that fact, the majority of the visitors focus their purchases only on traditional local products such as spices, olive oil etc. and they do not choose to leave the city with an original souvenir which could be both informative and attractive in their bags.

In addition  to the absence of interesting and unique souvenirs it also seems that Thessaloniki is in a very early stage of the creation of an organized network that will promote all its good characteristics and will make it an attractive destination for the visitors. A good example in this effort is the announcements of the results, of a recent contest for designers organized by the Archaeological Receipts Fund (ΤΑΠ).[1] The contest was about the creation of modern and fresh souvenirs, which will increase the visitors interest. A relatively new term that appeared in the last decade and defines all the strategies of promotion of cities with the contribution of public as well as private organizations is City Branding. The main goal of City Branding is the maintenance and reinforcement of local economy in order to make a place appealing, so that it attracts visitors and it keeps its own inhabitants. According to Kotler et al. (1999), with reference to European regions and cities, signalize that the economic dynamism of a region/city also reflects on the development dynamics of that place, attributing an attractive or unattractive character to it. The means which are used include logos, interesting slogans and last but not least more complex representations constituting a strong foundation for the Marketing sector. For several cities around Europe, City Branding has been transformed into a notable urban tool that aids the city's development.

Souvenir is a French word and is used to describe any type of object that a person can purchase in order to associate a place that they have visited or a personal experience with it. There is no specific rule of what the item could be and there is no limit in how expensive or cheap it is. Another interesting definition from Shenhav- Keller (1993), is that souvenir is perceived as an authentic reminder of a particular place and also a powerful signifier of ideological meanings. Indeed the word itself means "to remember". As they have also mentioned through their work, a souvenir is significant not only as a cultural artifact, but also as an analytical tool in order for the tourist to understand complex social processes.

---

1. More information on this Contest can be found at this link: http://www.tap.gr/tapadb/

According to Gordon Beverly (1986), there are people who find great differences between a souvenir and a memento and also refuse to appreciate souvenirs as part of their everyday life. He believes that souvenirs which are connected with tourism and are recognized for their role by everyone, are commercially produced, purchased objects, in contrast with mementos which are non - purchased objects and hold a really personal meaning.

There are several types of souvenirs, with the most popular being the pictorial images such as postcards, illustrated books etc. In fact, the postcards have the advantage over other souvenirs to move through space via mail and this is why they are also called universal souvenirs. The words that follow by Stefano Franko (1976), are another well explained definition of postcards:

*It is the one that is bought in all places by everyone, even by those who otherwise never indulge the souvenir instinct. It is the largest seller, by far, of any souvenir, and is found in spots that carry no other souvenir items.*

Another interesting type of souvenir is "the piece of the rock" which is literally a part of the whole. When we mention this kind of souvenirs, usually we talk about natural materials or objects of the original physical environment. One last significant kind of exciting souvenir is the local products which, over the last years, have become very popular especially in European countries. The tastiest products, which some of the times are accompanied by good design in terms of packaging, are being chosen and brought home from the tourists so that friends and family have the opportunity to familiarize themselves with different flavors. As an example, we can use olive oil from Greece, chili peppers from Mexico and vodka, the traditional drink of Russia.

## Methodology

### *Market research*

The literature review casts light upon the role of souvenirs for both locals as well as tourists, representing the city through its culture and history. However, within the scope of this dissertation it is deemed necessary to conduct a market research in order to register all the available souvenirs for the city of Thessaloniki. The aim was not only to categorize them but also to evaluate their quality and aesthetics. As it was mentioned earlier, although tourism is essential for the development of the city and its economical evolution, there is a major lack of different types of souvenirs in the market. Visitors are able to find in the local stores most of the typical kinds of souvenirs such as magnets, cups and t-shirts while there is also a more classic category of miniatures which refers to the monuments of the city such as the White Tower and other well - known sights. There are also some decorative plates on which are represented various pictures or drawings from the city or the monuments of the city. The majority of the existed souvenirs are made of porcelain and that might be difficult to be transferred because of its brittle fracture. Most of them are colorful, very descriptive and outdated, and it is obvious that they fail in design, and have no functional or artistic value. This is also the main reason why tourists do not prefer to purchase a souvenir from Thessaloniki and share it with friends and family. Instead, they choose to buy local, traditional products that are only produced in Greece which of course behave as a good type of advertisement for the city but are more expensive than the regular souvenirs and they are not assigned to create a long lasting relationship with the buyer.



Pictures 18, 19 : examples of different souvenirs of Thessaloniki

*Survey*

In order to study the preferences of the people that buy souvenirs, a survey was conducted. The aim was to record what kind of souvenir types the tourists choose to buy. The survey was answered by each participant through an online Google form prepared by the authors. The test set was based on an opportunity sample of 155 people with an age range from 20 to 60 years old. The survey that was conducted, consisted of eight multiple choice questions, some of which may have more than one choice, and one question that the participants had to answer in writing.

# Survey on the souvenirs of Thessaloniki

**GENDER**
- ○ MALE
- ○ FEMALE

**AGE**
- ○ 10-18
- ○ 18-29
- ○ 30-49
- ○ 50-...

**1. As a tourist, what kind of activities do you prefer in your vacation?**
- ☐ Visiting museums
- ☐ Visiting archaeological sites
- ☐ Walks through city
- ☐ Nightlife

**2. When you visit a country, what type of souvenirs do you prefer to purchase?**
- ☐ Pencils, pencil cases e.t.c.
- ☐ Magnets
- ☐ Calendar, sketch book e.t.c.
- ☐ Postcards
- ☐ Puzzle, board game
- ☐ Cup
- ☐ Key rings
- ☐ Bag
- ☐ T-shirt

Picture 20 : first page of the survey

## 3. How much money do you spend on souvenirs?

○ 0-5 €
○ 5-10 €
○ 10-20 €
○ 20-50 €
○ 50- ... €

## 4. For whom would you buy a souvenir?

☐ Family
☐ Friends
☐ Colleagues

## 5. How satisfied are you from the souvenir market of Thessaloniki?

○ Not at all
○ Little
○ Enough

## 6. Do you prefer for the souvenir to be a replica of a city's monument or not?

○ Replica of the monument
○ Abstract design

## 7. What would you like to find in the souvenir market of Thessaloniki that does not exist?

[                    ]

## 8. In your opinion, how important is the existence of souvenirs in a city's successful promotion?

○ Not at all
○ Little
○ Enough

**Submit**

Picture 21 : second page of the survey

## Data analysis

### *Results of the survey*

The results obtained from the survey were further processed in order to extract quantitative conclusions. The answers were compiled and classified, and through spreadsheets we were able to visualize our data and gain a greater insight. It was therefore possible to  compare the participants' answers and to present the results in the form of charts, from which deductions can be drawn.

Table 2 and 3 show the gender and the age of the majority of the participants. As it is obvious an overwhelming majority of them are female and between the ages of 18 and 29.
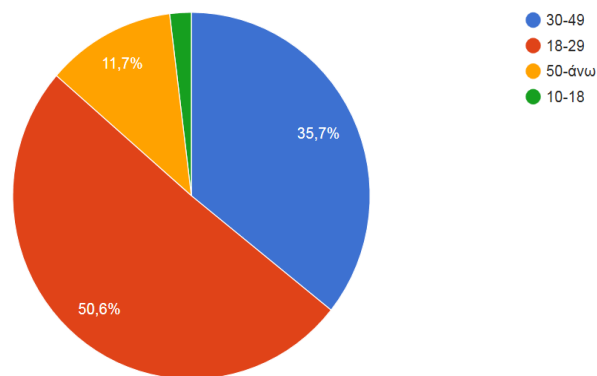
Table 2:  age of the participants
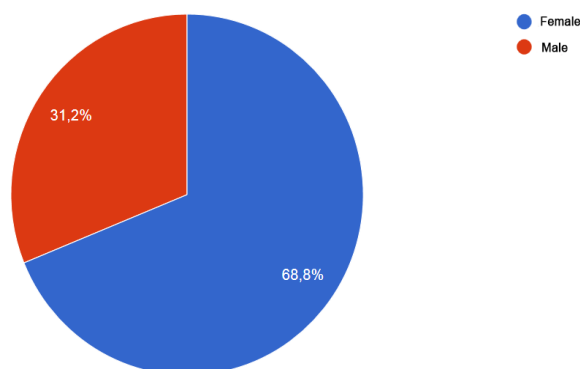


Table3: gender of the participants

Table 4 shows that most of the tourists, for the duration of their vacation, prefer to walk around the city so as to discover and learn as much as they can about the traditions and habits of local people and they are less interested in visiting archaeological sites and museums. The next results are about the tourists' preferences regarding the different kinds of souvenirs that they can find each time in the local market. Table 5 illustrates that the majority buys magnets, cups, and some of them key rings, postcards and t-shirts. At this point it is also worth commenting on the, rather surprising, fact that there are few of them that would purchase board games and puzzles as a souvenir, and the reasons behind that are to be discussed later.

Table 4: activities that tourists prefer
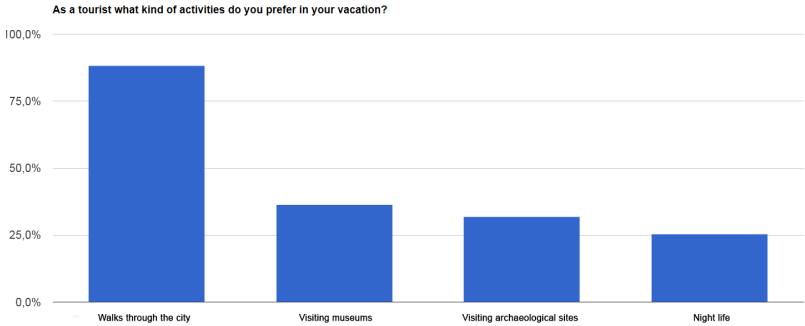


Table 5: type of souvenir that participants prefer
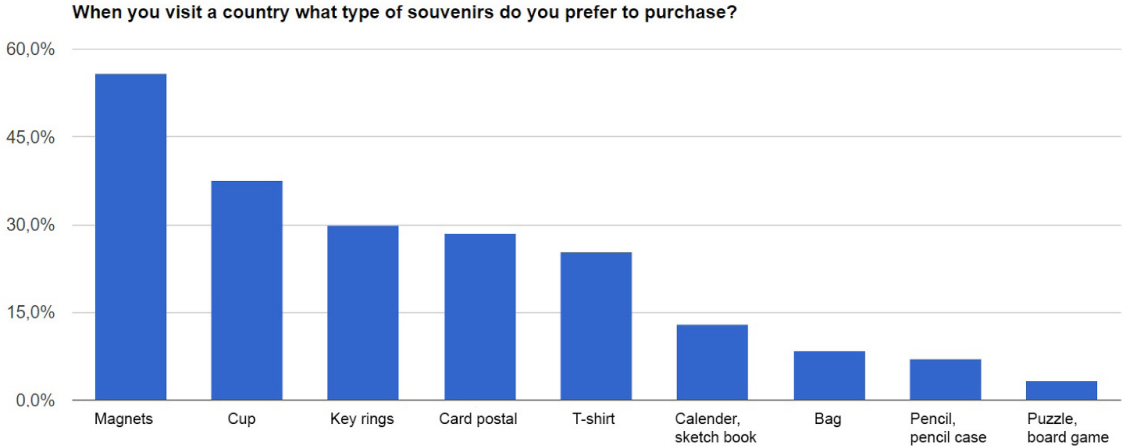
As for the money that tourists spend on souvenirs during their journey, table 6 indicates that most of them are willing to purchase souvenirs that cost roughly between 5 and 10€. There is also a significant percentage whose souvenir expenditure amounts to 10-20€. Table 7 indicates that people buy a souvenir as a gift, they are more likely to give the latter to friends and family rather than to colleagues etc.

Table 6: the amount of money spent per tourist

**Money spent**



- 10-20 €
- 5-10 €
- 20-50 €
- 50- άνω €
- 0-5 €
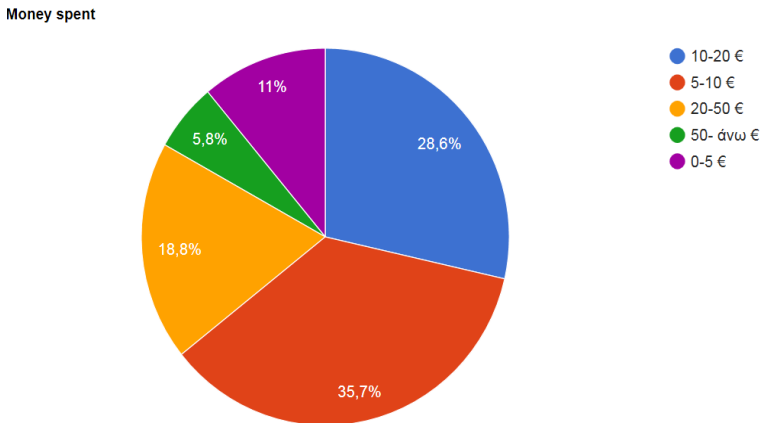
Table 7: preference about the choice of a gift

**For whom would you buy a souvenir?**
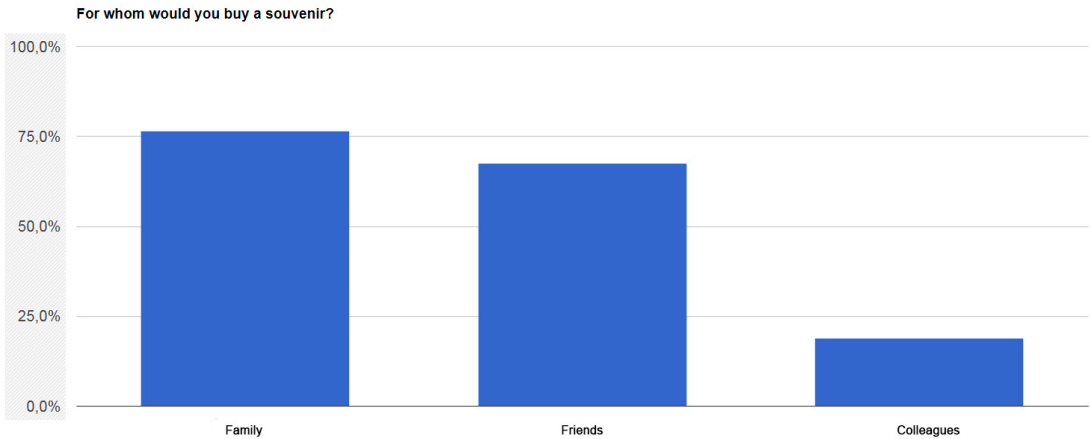
Table 8 demonstrates the level of satisfaction from the variety of souvenirs that tourists can find in the local market. It can be observed that most of them are not satisfied.

Table 8: satisfaction rate about the existing souvenirs

**Satisfaction rate**
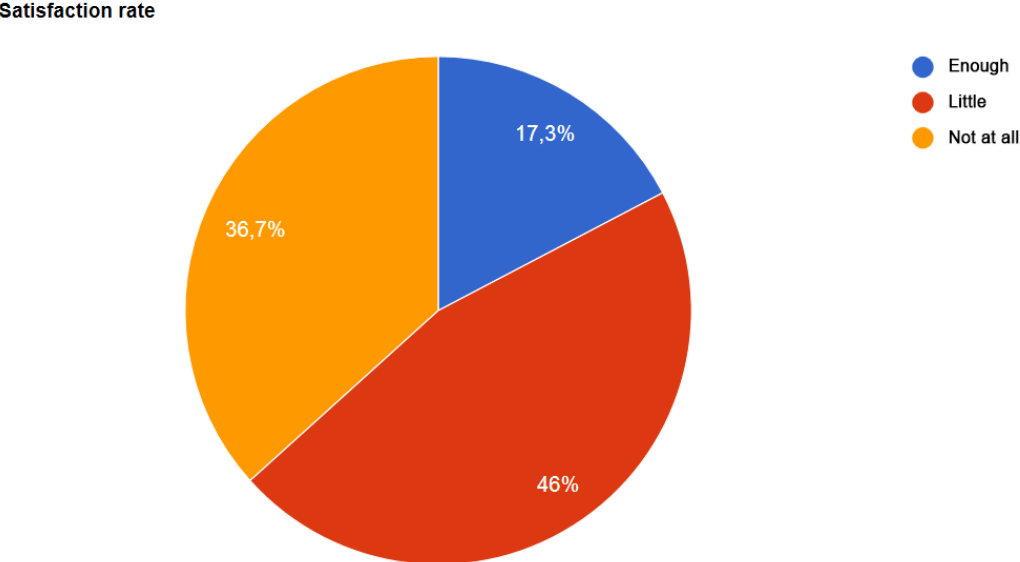


Table 9 concerns the results of whether they like souvenirs that are replicas of the original monuments, versus more abstract designs.

Table 9: participants preference about the design of the souvenir

**Do you prefer for the souvenir to be a replica of a city's monument or not?**

The last table shows what participants answered in the survey when they were asked about the importance of the existence of souvenirs. As it is easily observed, the majority said that souvenirs are significant for the development of tourism and the successful promotion of a city.

Table 10: importance of the souvenir existense

**In your opinion how important is the souvenir existense for a city's good promotion?**



*Discussion*

The results of the survey showed that the majority of the participants in the sample are not satisfied with the souvenir market and that the design of the new and old souvenirs plays an important role. F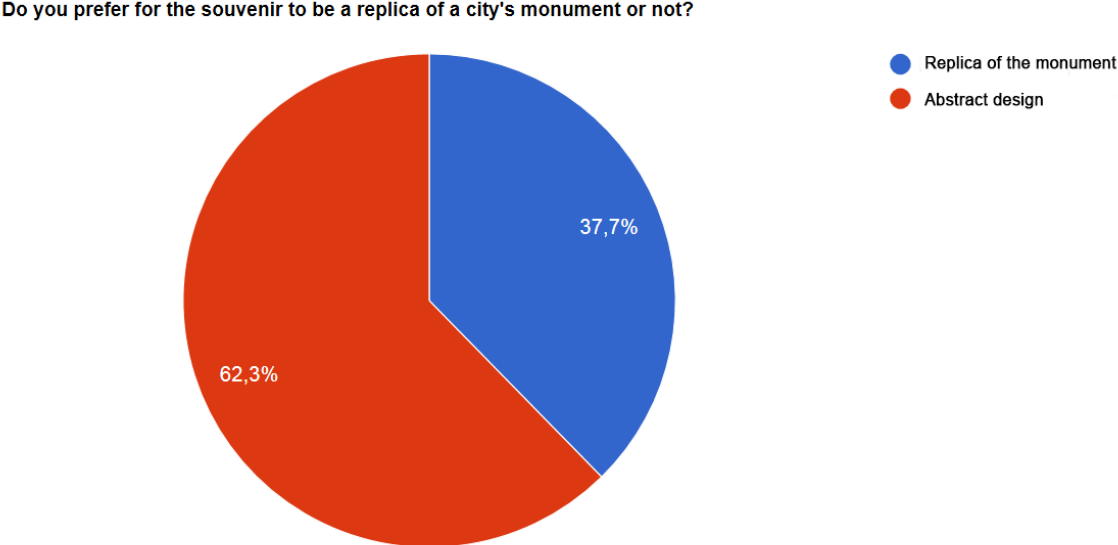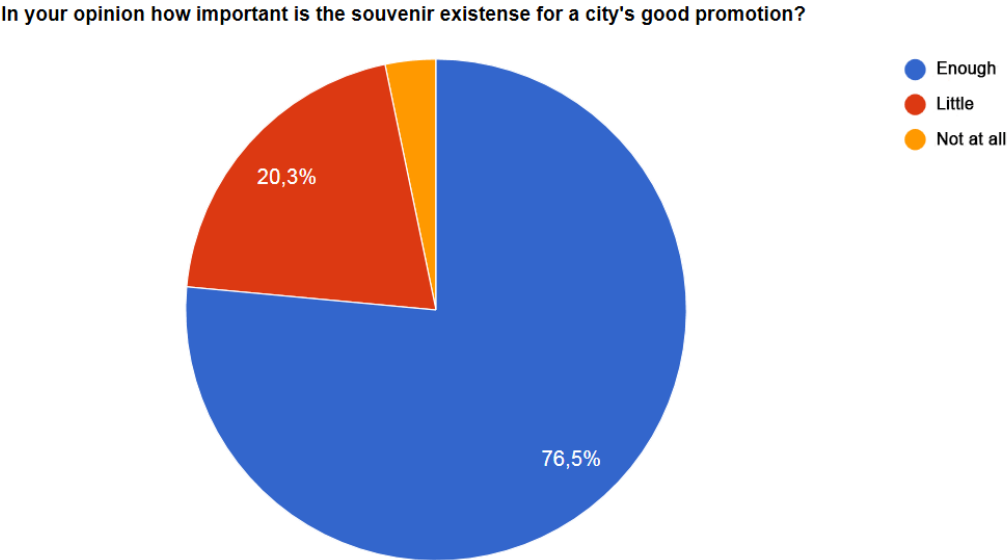irst of all, a demographic recording of the sample was made in order to understand the preferences of the tourists, in relation to the factors of age and gender. The majority of the responders were women and it can be easily inferred that women might buy souvenirs more easily than men. Moreover, most of the responders were between 18-29 years old, possibly because at those ages young people travel extensively both for pleasure and studies. The second-largest percentage involved people between 30 and 49 years of age, who tend to travel for vacations or business purposes. The smallest percentage involved people between 10 and 18 years old, which makes sense since they are too young to travel or even shop on their own.

Secondly, when asked what they prefer to do when they visit a city, most of the participants chose going for walks in order to explore the culture and the life of the city. This is probably connected with having the opportunity to learn about the traditions and the habit of the local people, and even experiencing them first hand. Slightly below average is the percentage of responders preferring to visit museums and archeological sites because they are interested in learning about the history and the historical figures of the country or city that they are visiting, The smallest percentage, finally, consider the exploration of nightlife of the city that they visit as a priority in order to feel ''immersed'' in the different culture that each city provides.

Furthermore, to the question of what kind of souvenirs the responders prefer to purchase when they visit a different city, over 50% choose to buy magnets as they are cheap and in most cases, represent a monument or a landmark of the town and they can be used to pin papers or decorate as part of collection. To a percentage slightly below the average, tourists prefer to buy cups with a printed picture or a characteristic drawing of a monument or a landmark on them. We also see in table 4 that between 25% and 30% usually buy key rings, post cards or t- shirts, which are easy to find and also relatively economical. Nearly 10% of participants opt to buy calendars or bags or pencils which can be practical, since they can be used in everyday life but they have the downside of being disposable and cannot be kept for an extended period of time. The puzzles and board games fell under the lowest percentage, as they are not the first choice as souvenirs, because they are often perceived as addressed to children and do not have another function that would allow them to serve a double purpose.

Another significant piece of information to be gathered by the survey's answers, is the amount of money that each tourist spends on buying a souvenir. The majority of the people that participated choose to spend up to 10€ on souvenirs and only 5.8% spend more than 50€, most probably because tourists usually buy more than one souvenir, therefore they do not want to spend much. Furthermore, table 6 indicates for whom each visitor buys souvenirs, and most of them predictably preferred to buy them for their family and friends only few extended that generosity to their colleagues.

Analyzing the next results of the survey we see that approximately half of the responders claim that they are not satisfied with the souvenir market and they would like to find more diverse and unique objects on offer. There were also some people who answered that they are completely dissatisfied with the existing souvenir designs.

Another important element was that more than half of the responders prefer to buy a souvenir which is not a replica of a monument. A replica is a precise copying, such as of a painting or a piece of art, closely resembling the original concerning its shape and appearance. Thus, we deduce that there is an urgent need to design souvenirs which will represent a more innovative , abstract design.

Last but not least, we asked people to state how important the existence of a souvenir's market is for the promotion of a city, and approximately 80% answered that it is very important for the development of tourism and boosting the economy of a country, as theirs is an industry that can evolve through time and better designs. Finally, an open - ended question rounded up the survey; it requested that each participant should write what he would like to find in the souvenir market that does not currently exist. The majority wrote that they want unique designs which will be attractive and functionally interesting in order to buy them. Moreover, some noted that they would like multifunctional souvenirs, as it might be more amusing and interesting to objects that serve more than one function. Furthermore, there were many responses claiming that the existing souvenirs are old - fashioned and lacking in design originality, and that it is quite frustrating to see exactly the same type of souvenirs in every country and city. They also commented on the quality of the existing souvenirs, or rather, lack thereof, because the industries do not care about the quality but the quantity, in order to be able to sell at more competitive prices. Another important statement was that it would be very interesting if there were souvenirs which would be amusing, educational and funny; for instance, one person recommended designing a general branding for the city which will be represented by the souvenirs that are going to be designed.

## Case studies

An important step before the design phase of the new souvenir line is to examine the quality of the existing 3D puzzles. It is worth mentioning that all the 3D puzzles that we could find in the local market are portraying monuments and historical buildings from other cities around the world but there is a lack of this type of puzzles for the monuments of Thessaloniki and Greece generally. There are two types of 3D puzzles that are examined here, their main difference is the material that they are made of. In the first category, the pieces of the puzzles are made of wood and in the second, they are made of neofoam paper for modeling. Through the case studies the authors were able to detect the differences between these materials with regards to hardness, the ductility and the durability in time. Moreover, the purpose of examining those two different types was to decide which of these puzzles has better aesthetic quality and functionality. Thus, the aforementioned study resulted in the creation of a list of all the advantages, the disadvantages and the similarities of both puzzles, as well as the problems that the team faced during the process.

### *Taj Mahal - neofoam*

The neofoam paper puzzles consist of many pieces which have notches and fractures in order to connect them. We have to stress that this material is very easy to use and it does not take time to solve each puzzle. The facades of the monuments are printed on each piece of the puzzle in lots of detail making it sort of replica. On the other hand, it is colourful and that is why it could be seen as lacking in taste, with all the clashing colors. It consists of one base which symbolises the surroundings of the monument, the pieces for the facades and smaller pieces for the domes and the minarets of Taj Mahal. In the process of constructing the puzzle, we started from the facades and continued with the domes in order to complete the structure of the 3D puzzle. Then the model was placed on the base and the four minarets on each corner. In some points, specifically the domes, because of the ductile nature of the  material there were somes indentations. The same technique structure was followed in order to solve the puzzle for the Sydney Opera House.
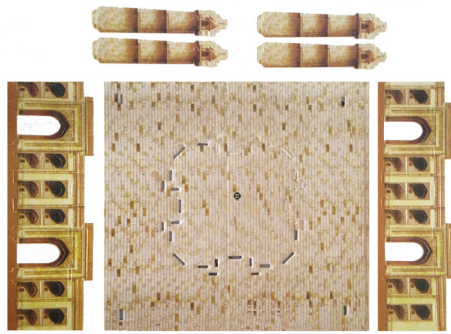
Pictures 22.23: Taj Mahal neofoam 3d puzzle

**Eiffel Tower- wood**

This type of 3D puzzle has a more minimal design as its morphology and depiction is not as detailed as the Taj Mahal. Its structure is an outline of the monument since the purpose was to represent an abstract design of the tower. Moreover, in contrast with the Taj Mahal, the Eiffel Tower puzzle is more tasteful because of its design. However, this 3D puzzle presents the most serious disadvantage because the material is much stiffer than the neofoam paper and it was very difficult to remove the pieces from their place in the package. Furthermore, when we assembled the different pieces, the angle of the tower was very difficult to stay in the right position and the result was to break some of them. Finally in order to stabilize the whole puzzle the use of glue was necessary, meaning that the product has failed its aim.
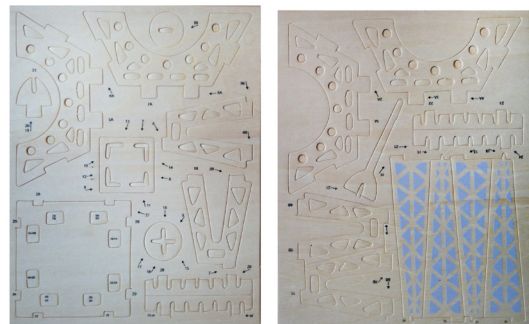


Pictures 24,25: Eiffel Tower 3d puzzle

Analysing the two different types of 3D puzzles we noted all the characteristics that we would like to follow in order to design our new line of 3D puzzles. First of all, we chose to design a puzzles that will be as minimal in terms of morphology as the Eiffel Tower puzzle is. Minimal design is an approach that permits different interpretations and triggers the imagination of the user. It is a more creative approach for both designer and user, it may allude to the designers stylistic preferences and passes from a mere depiction to an artistic or symbolic representation. On the other hand, a minimalistic design approach can become too abstract and lose the associativity with the monument, thus the new line should be designed with the required attention in order for each monument to be recognized by everyone. Although minimal design is very popular among architects and designers, this may not reflect the opinion of the general public with regards to aesthetic criteria.

The Taj Mahal puzzle is much more colourful and the aesthetic response may vary among different users. Colors have a tremendous effect on perceptions and feelings, they may even affect our perception of geometry, accentuate certain characteristics or even evoke different memories and ideas. There is a tendency among the design world to believe that the less colourful a design is the more elegant it appears, as it seems more minimal and sometimes luxurious. However colour in certain cases may be a crucial characteristic, therefore it is not possible to generalize and claim that the lack of colour is always a virtue, each design object needs to be judged separately with regards to aesthetics.

'Aesthetics' comes from the Greek word aesthesis, relating to sensory conception and understanding. Since works of art are mostly produced with the criteria to satisfy our senses, the meaning has since been applied to any feature of the experience of art, such as aesthetic attitude, understanding, emotion and value. Considering the two types of 3D puzzles, Taj Mahal displays a lower aesthetic quality. The detailed printed facades, the abundance of colors and the material creates an overload of visual information, which seems to be unclassified with regards to its importance and therefore confusing. This type of representation for a monument as 3D puzzle may be considered by many people as ugly, or without style namely as kitsch. The word kitsch was first addressed to 19th-century artwork and was later generalized to refer not only to art, but also to fashion, architecture, or attitude in general. sentimentality. The word "kitsch" has obviously a negative connotation when it is used to characterised drawings, objects, or designs, it is a synonym to poor taste because of immoderate flashiness

or sentimentality, in few occasions however it may be appreciated in an ironic way. As the head designer of Braun company, Dieter Rams in 1970's stated that one of the 10 principles for a good design is to be aesthetic : "The aesthetic quality of a product is integral to its usefulness because products are used every day and have an effect on people and their well-being. Only well-executed objects can be beautiful" (Press office of SFMOMA, 2011). Last but not least another important difference between these puzzles was the materials as wood is a familiar material for everyone and it looks better than the neofoam paper as a final product. However, wood was quite difficult to be used in order to solve the puzzle as it is stiff and has not any flexibility. We present in the table below the differences between the two types of 3D puzzles:

Table 11: differences between the two products

| Eiffel Tower - wood | Taz Mahal - neofoam |
| --- | --- |
| minimal | colourful |
| abstract design | very detailed |
| good aesthetics | bad aesthetics - kitsch |
| stiff material | flexible material- easy to handle |

The first characteristic that was observed in both types, was the small - sized and stackable packaging of the puzzles even though the scale of the buildings or the monuments was normal and it could be recognized by the morphology and the details of each one. Stackability in packaging is the capacity of storing as many products as you can depending the shape and the design of the package in order to maximize the storage space. Secondly, both puzzles come in an oblong box in which all the pieces are arranged with the method of nesting on packaging. Nesting is the way in which the different parts are organised in order to save space and not waste material. There are several nesting softwares that efficiently arrange the required quantities of individual parts to be produced from CAD files to a cutting machine. Furthermore, both puzzles have a good and reasonable price for their quality and as puzzles and games they both provide interesting souvenirs. Table ? summarizes all the similarities between the two 3D puzzles.

| Eiffel Tower - wood | Taz Mahal - neofoam |
| --- | --- |
| clever packaging- stackable | |
| reasonable price | |
| interesting souvenir | |

To conclude, each type of the existed 3D puzzles in the market has each own characteristics which help us to understand the difficulties and the expectation of these kind of products in order to use them us guidelines for our new design proposal. Furthermore, it is important to collect all the required information about the monuments of Thessaloniki in order to choose the most valuable ones.

1. Yedi Kule, also known as Eptapyrgio which means seven castles, is the first historical

## Documentation of monuments of Thessaloniki

The last step in order to collect all the necessary information before the design of the new line of souvenirs is to define all the significant monuments that are sited around the city of Thessaloniki and to record all the facts that are needed about their history and structure. The selection of these monuments was deliberately made and is shown in the map below. Our first need is to design souvenirs for monuments and landmarks of Thessaloniki that have been built in a different time or century so that each of them reveals another aspect of the town's history and culture and all together will create a complete survey of it.



1. Genti Koule
2. Rotunda of Galerius
3. Arch of Galerius
4. Church of Agia Sofia
5. White Tower
6. OTE Tower
7. Museum of Byzantine Culture
8. Water supply Museum
9. Ahmed Kapadji Mansion

Picture 26 :  Map of the monuments

monument of our list, and is located in the northeastern part of the walls of Thessaloniki. Many decades ago, the complex was used so that the guards would keep the city safe from assault and raids. Along with the fortress of Vardar in the Western, Top Hane and the White Tower, the Yedi Kule was one of the most important fortresses that were responsible for the defense of the city. Around 1890, Eptapyrgio was used as both male and female prisons. The jail served as the main correctional facilities of the city, where the prisoners were held regardless of sex or crime. Some years later, a few new buildings were built along both sides of the walls in order to improve the functionality of the new penitentiary center. The inner yard was divided by fences into five separate units and the central observatory was placed within the center. The prison had a church and other annexes, while the tower that was in the north-eastern side was destroyed during the Second World War. The outer buildings on the south side of the castle housed the administration, the prison for women, and to the west, the isolation cells.

During the year of 1989, the prison was transferred to another facility and until now the monument is under constant reconstruction which began before the fall of the dictatorship and is continuing until today. Nowadays, only one of the buildings is still in use and hosts the 9th Ephorate of Byzantine Antiquities of Thessaloniki. As for the courtyard, there are several social events that take place there during the spring and summer months.



Picture 2: External view of the castle
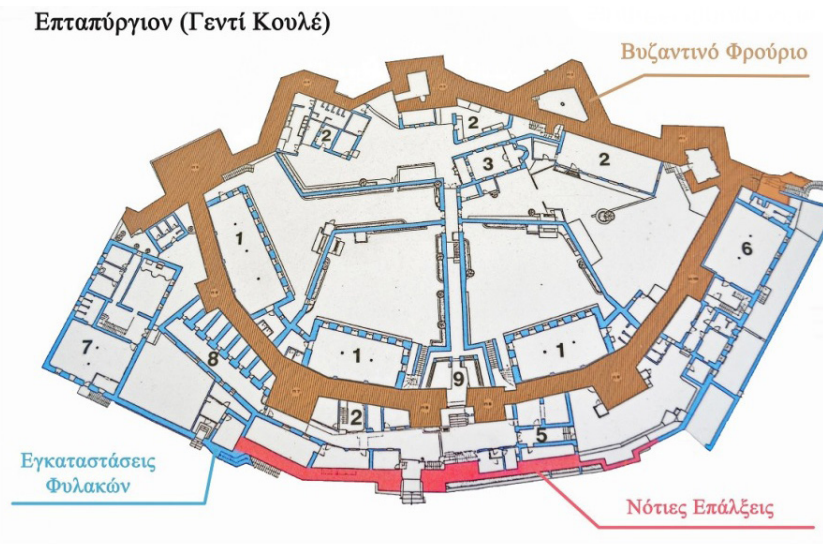
Pic.ture 28: General plan of the castle

2. The Rotunda of Galerius, also known as the Greek Orthodox church Agios Georgios is the first historical monument that has been recorded in the city and was built by the Roman emperor Galerius around 306 AD. As Robin Cormack (2000) mentions in his book, the structure has a diameter of 24.5 m and its walls are more than 6 m thick, which is why it has withstood the earthquakes that took place in Thessaloniki. The walls are interrupted by eight rectangular bays, with the south bay forming the doorway. A flat brick dome 30 m high, crowns the cylindrical structure. After serving three religions, the Rotunda is now open to the audience and ready to welcome many cultural events.
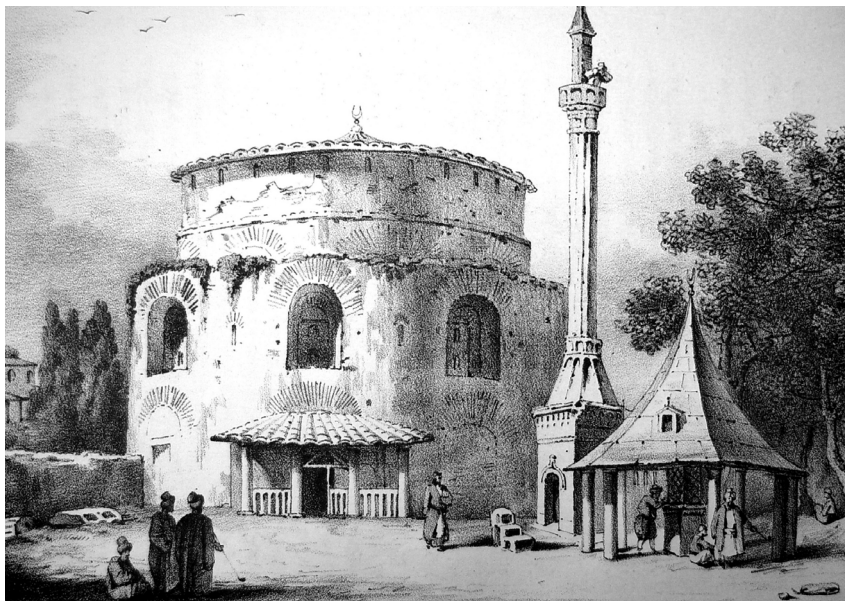


Picture 29: Old picture of Rotunda

3. The arch of Galerius, or else known as Kamara, is another significant landmark of the city, which stands on Egnatia street, one of the most well - known regions of the center of Thessaloniki and very close to the Rotunda. The structure consisted of a dome supported by four central columns forming four gates, two on Egnatia street and the other two on today's Gounari street. At the moment, only two of them have survived and the entire eastern side and the southernmost one of the western pillars are lost. It is registered that it was built between 298 and 299 AD and after a few years it was dedicated to the victory of Galerius over the Persians.



Picture 30: Old picture of the arch on Egnatia street



Picture 31: The remains of the arch

4. Another monument definitely making the most - important - sights - to - visit in the city is without doubt the Christian church of Agia Sophia not far away from the 2 monuments above. Visitors of Macedonia are always enchanted by the 1600 - year old history of the church, which is mentioned as one of the most impressive Byzantine churches of Thessaloniki. The construction is supposed to have started around the 7th century AD and through all these years additions and changes have been made inside and outside the building. Like several other monuments of the city, the temple was significantly damaged because of the fire in 1917, had remained derelict until 1911 and was afterwards gradually restored. According to Y. Epaminontas and I. Stephanidis (2012), the exterior of the church is not very attractive, but it occupies a fine garden with palms and pine trees. The west facade is plain, flat, and square, but the east side looks like a typical church that belongs to Byzantium. The interior is exceptionally spacious, covered with a dome of 10 meters in diameter. Concerning the courtyard, it is below street level and the surrounding wall was designed by an architect called Aristotelis Zachos. The fountain that is visible in older pictures dates back to 1911 and its remains are nowadays buried under the courtyard's flowerbeds.

Picture 32: View of the courtyard and the central entrance of the church
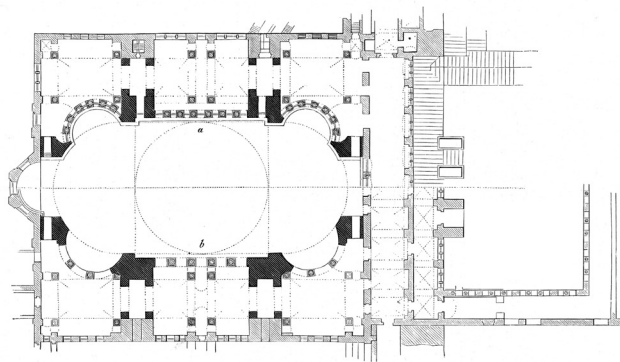


Picture 33: Plan of the church

5. The White Tower is not only a monument that stands on the waterfront of the city but also a museum for the thousands of tourists that visit every year. The present tower replaced an old Byzantine fortification which was erected around the 12th century and was reconstructed by the Ottomans to protect the city's harbor. The structure of the Tower is very simple and clean. It is a cylindrical drum of 23m diameter with a height of 34m above sea level with a turret on the top which has 12m diameter and 20m height. The tower has been altered substantially over the decades. Early illustrations show that it was earlier covered by a conical roof, like similar towers in the Yedi Kule Fortress. Until its demolition in 1917, a chemise stood at the foot of the tower, supporting the heavy guns and enclosing an area at least three times the diameter of the main tower. Octagonal turrets on the chemise and caponiers at ground level

provided flanking fire all around the tower. It is unclear whether the chemise was part of the original scheme for the tower or a later addition. At present, the tourists have the opportunity to visit the museum inside the Tower and experience a journey back in time from the early days of the city's birth until the recent years. Additionally, they are able to admire the excellent view of the city, considering the advantageous position of the monument.


Picture 34: View of the White Tower

6. Ote tower is a 76 - meter - tall tower and is located in the center of Thessaloniki, inside the international exhibition center. The design belongs to the Greek architect A. Anastasiadis and it is definitely considered a modern building, made as it is out of steel and concrete. The construction of the tower was finished by 1965 and it opened for the public one year later. The whole structure was not completed at once up. Until 1966 only 8 out of the 76 meters had been completed and during the 35th Helexpo exhibition people were able to visit the tower and get up to the 4th floor where an innovative rotating cafeteria became the attraction of the city for many years. The construction was completed in 1970. In 2005 the tower was renovated, but still most of the space inside is not in use. At first it was used for the black and white broadcasts on a Greek television network, and, some years later, in 1970, was used to hold the antennas of an experimental analogue mobile telephone network. Nowadays, it is used by the Cosmote cellular mobile telephone network. To this day the OTE tower remains to one of the most famous landmarks of the city.

Picture 35: Night view of the tower

7. The Museum of Byzantine Culture was established in Thessaloniki in order to serve as a center for the preservation and research of the evidence of Byzantine civilization who survive in the Macedonian region and particularly in Thessaloniki, the city which was the center, next to Constantinople, in the European section of the Byzantine Empire. By the completion of the museum in 1994, the end of a story that had begun long before, shortly after the liberation of the city in 1912 was marked. Another significant role of the museum is to serve as the seat of the European Centre for Research of Byzantine Civilization, established in collaboration with Unesco, for the purpose of providing further education to scholars and scientists on matters pertaining to the research and preservation of Byzantine monuments. The building was designed by the famous Greek architect K. Krokos (1941-1998), a man regarded as a gentle and uncomplicated personality. The construction was finished between the years 1989 and 1993. The main structure stands out for its modern materials and the combination of Greek architectural tradition and modern and austere features. It is considered to be one of the best public architecture projects in Greece.

Picture 36: The patio of the museum

8.  The next monument is more recent than the previous ones and is situated outside the center, in a region called Sfageia near the western entrance of the city. The building belongs to Thessaloniki Water Supply and Sewage Company (EYATH) and is also known as the old Pump House.). It was constructed between 1890 and 1892 by a Belgian company, as part of a campaign to modernize Thessaloniki, along with other projects like the railway lines and the gasworks, and later on the electricity company and the cable car network. Nowadays, it is houses the Water Supply museum which opened to the public in 2001. The museum targets to inform the public about the history of supplying water to the city, to demonstrate the various steps in supplying a city with water, from water catchment to water consumption, and make the public familiar with issues like reducing water waste, so that they develop environmental awareness, especially as far as protecting the environment and water resources is concerned.



Picture 37: External view of the EYATH building



Picture 38: Internal view of the EYATH building

9. Last but not least, the monument rounding up this documentation is known as the "Ahmed Kapadji Mansion''. It was designed around 1905 and was located in the district known as "Pyrgoi" (towers) that was created at the end of 19th century, east of the historic walled city. The architect that took over the construction of the mansion, which was completed in two years, was the Italian architect Pierro Arrigoni. The building belongs to the architectural movement of Eclecticism and has elements of the Art Nouveau style. It lies in the center of an architectural plot, the narrow side of which is on the Vass. Olgas Avenue (old Hamydie Avenue), overlooking the sea. Pierro Arrigoni was inspired by the natural beauty of the new suburb and decided to adjust his designs to accentuate the picturesque, rural character of the composition, by designing sharply sloping roofs that meet each other and remind one of Italian chalets. The facades are characterized by the contrast between built up volumes and voids that are created by the bow- windows, the towers and the balconies, which are protected by the projecting wooden roofs.

According to Michail Nomikos, an architect and professor in Aristotle University of Thessalonikı, through the decades the mansion has been used in different ways and each of them has left its marks on the building. At the beginning, it was designed to be used as a house for the family of Ahmed Kapadji, later accommodated the nurse school, Red Cross and some services of NATO. All these transformations of an upper class mansion built at the beginning of the century, created many problems to the original structure, especially during the years when the building housed a public high schooL, the famous all - boys 5th high school of Thessaloniki. Later a request was made for a restoration that would have an educational character integrated in the new role of the building as the seat of the "Thessaloniki Cultural Capital of Europe-1997". So the restoration was important and was aiming at the complete remodeling of the interior, the redesign of the courtyard and of course the restoration of the exterior facades of the building keeping as many of the original features as possible. Nowadays the mansion belongs to the cultural foundation of the Greek National Bank and it has been characterized as one of the most significant landmarks of Thessaloniki.
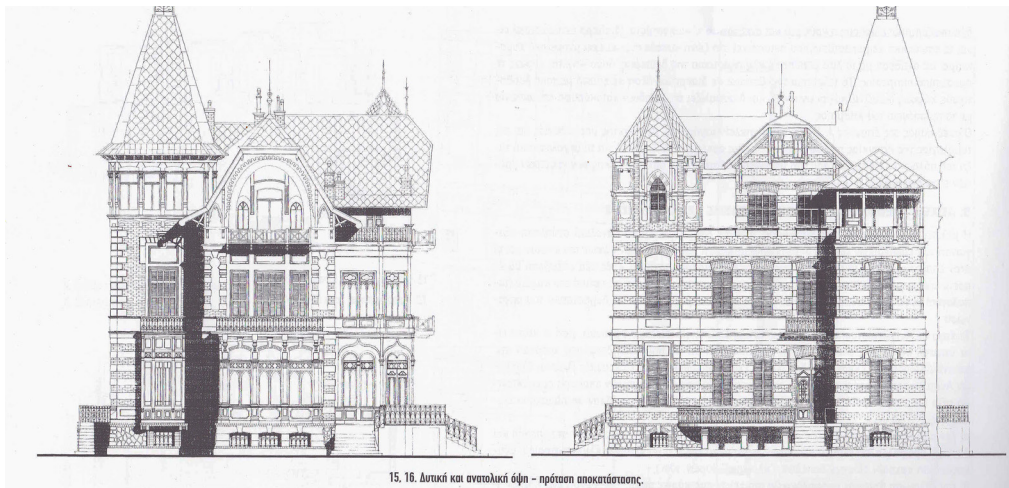
15, 16. Δυτική και ανατολική όψη – πρόταση αποκατάστασης.

Picture 39:  West and east facae of the building

## Design proposal objectives

The word souvenir has obtained  bad connotations during the years, as it usually refers to mass produced, low cost, and low quality objects. Our purpose is to change the negative perception of souvenirs and design an object of high artistic value.  Taking into consideration all the above, we decided to set a goal of  introducing a new type of interesting and unique souvenirs for all ages, which will not only be entertaining but also educational for both tourists and local people. These products will be characterized by minimal design, both in terms of packaging and actual product, and will hold the buyer's interest from the moment they open it, until they finish solving the 3D puzzle. Additionally, their role will not be limited to reminding the tourist of all the great places he has visited, but will also be appreciated by the receivers if offered as a gift. The aim is to go beyond the mere design of a souvenir and rather propose a species of an art object with special emphasis on its aesthetic value. Therefore, a new line of architectural scale models is proposed with the objective to:

The purpose of the new line of souvenirs is to:

1. target a very wide audience (global)

2. educate the buyer about the city's monuments

3. fall within a price range that the buyer can afford easily when compared with similar products

4. promote a long lasting relationship with the tourist and not be a one use item

5. be a DIY game in order to keep the tourists' interest alive

6. be multifunctional- not boring

The first thoughts about our design intentions are reflected in the moodboard presented in the next page. The moodboard is a compilation of images that reflect the atmosphere, including images, concepts, keywords and other visual stimuli.
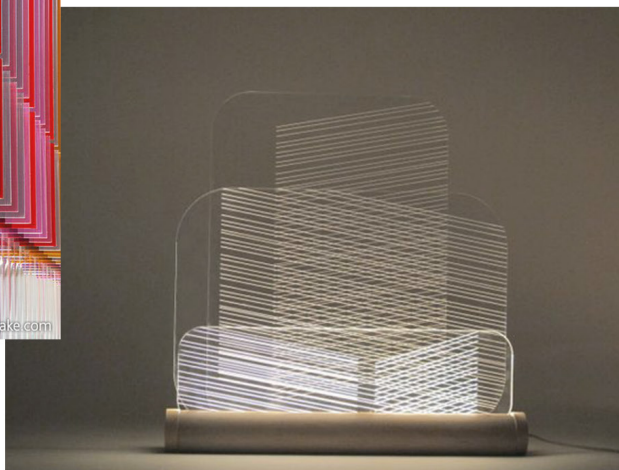
*Moodboard*

©fotofil
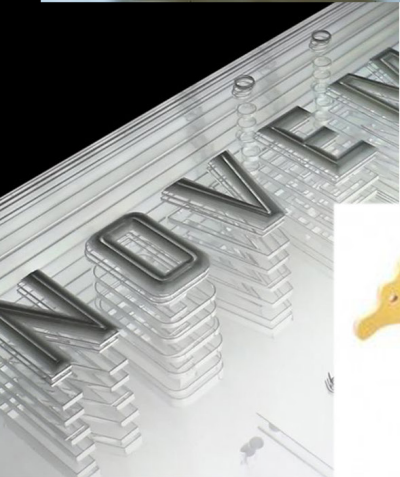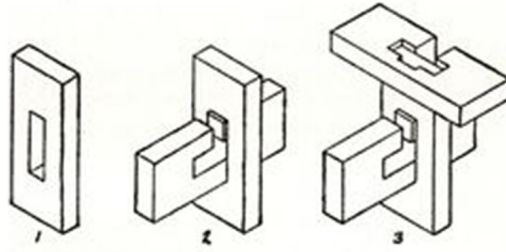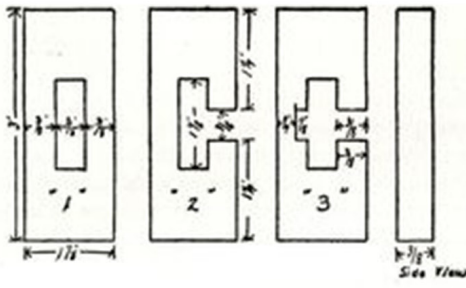
**Stackability**

educational

innovation

3D puzzle

*Manufacturing Method*

As our aim is to construct the prototype and test it, it was necessary to study the available equipment to digitally fabricate the object. The main purpose of digital fabrication is to allow designers to create any kind of physical model so as to implement all the changes they want for their design and test its success. The main purpose of digital fabrication is to allow designers to create any kind of physical model so as to implement all the changes they want for their design and test its success. Computer-aided design and manufacturing (CAD/CAM) has been a central component, which has been a central component of industrial design and engineering and of manufacturing industries for more than a half century. Every product from engine parts to mobile phones are designed and sometimes built using 3D-computer-modeling software. Scaled models can be made quickly by using rapid-prototyping machines that become punctual physical models from the data of the computer-aided design. Once the computer model is processed and completed, the data are transmitted to computer-controlled machines that make scaled parts from a variety of materials such as aluminum, steel, wood, and plastics. It is a promising technique that bridges the gaps between digital technologies and the common production process.

There are two subcategories, additive and subtractive fabrication. The 3D printer falls under the first one, while the second includes CNC routers which work on the Cartesian coordinate system and the laser cutter. The latter can be used to carve very thin materials, such as wood into shapes that can be used in order to create a 3D object. Based on the material selection and the ability to cut not only big but also smaller pieces into any kind of shape we want, the laser cutter is the technique that is better-suited to the purpose of the 3D souvenir products. Laser cutting is being controlled by a computer and uses a high-powered beam to cut several material. As the laser guides its beam along the material, it burns or melts everything in its path. One of the benefits of laser cutting technology is that the product most of the times does not need any finishing work as this process ensures a high-quality surface finish. The particular model that we used in order to cut all the necessary pieces of the 3D puzzle is the " Epilog Zing 16" laser cutter machine. One of the most significant features of the laser cutter,  is the Laser Dashboard which controls the laser's settings from a wide range of different softwares such as  CAD drawing packages and design programs. This device allows to the user to control all projects from the simplest to the most complex.

Table 13: Properties depending the material
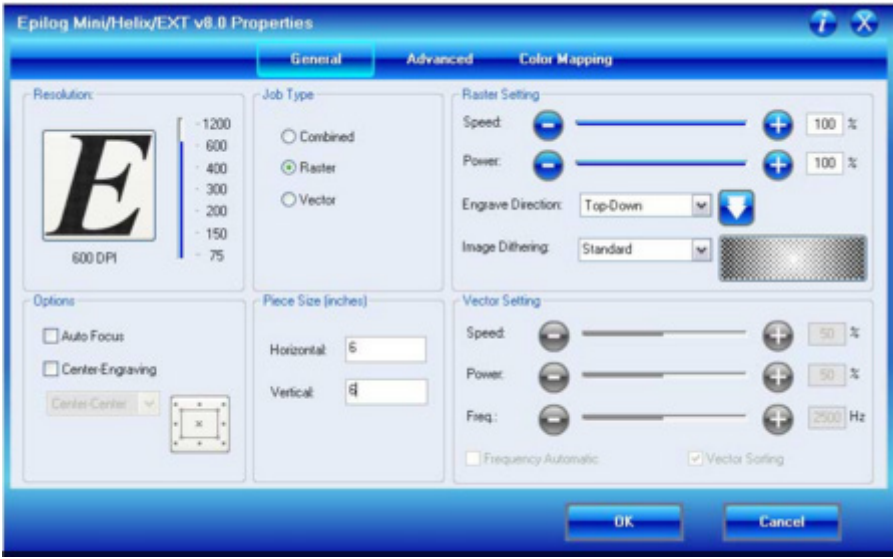




Pictures 40: Epilog Zing 16

## Arch of Galerius

### First phase

The first phase of the design, in order to understand the scale and the proportions of the structure, was to cut and create a model by hand and without the help of a laser cutter. The model was made out of thin cardboard for the sake of convenience and was very enlightening for the next steps of the design process. During this step, important decisions regarding the shape and the final size of the new 3D puzzle were made. As it was mentioned earlier, our aim is to create souvenirs that will be characterized by minimal design, with simple lines and lacking of textures and multiple colors. Considering all these facts, along with the existence of the first real model, we were able to judge which of the features of the Arch of Galerius are the most significant ones and should be highlighted, and which did not need to be included in the final model.



Pictures 41: first phase of the design

### Second phase

As a next step of the process, a 2D drawing and later a 3D model were constructed, using the software Rhinoceros, which is compatible with the laser cutter machine that was used for the 3D puzzle. During this step, as table ? shows, many trials were made in the properties panel so that the material did not melt along the cut slots. From this moment on, all the changes that we would like to make in our real model first had to be made through the computer in the 3D model. The main idea was to create a construction that would consist of 2 parallel pieces - walls that would be joint together with the support of 2 arches and would be closed with smaller pieces all around. The walls were the only pieces with slots, as opposed to all the others,
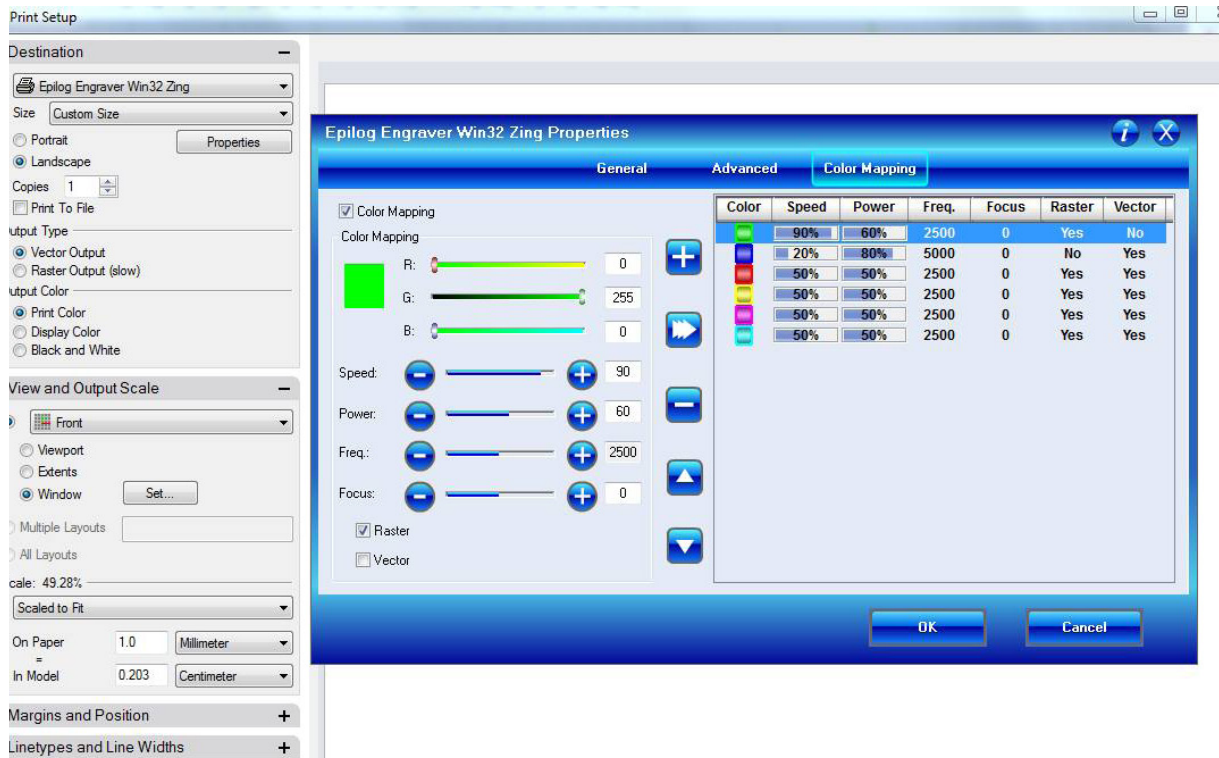
Pictures 42: table of preferences before the laser cutting



Pictures 43: using the laser cutter

which were fitted with small extensions in order to fit into the slots. In this step, we both used cardboard and wood, in order to see the different outcomes. Cardboard was more flexible than wood but was not attractive enough to satisfy the customers. On the other hand, as it was obvious, the option of wood was not acceptable for the type of shapes that were being cut, i.e. the arches. Wood was brittle and not flexible enough to be inflected and create the semicircles of the monument. More specifically, during the time of assembling of the puzzle, the pieces whose shape was similar with the shape of the arches broke at once. The result of the first trial of the 3D puzzle with both materials, was quite satisfying and helped us to understand its structure. It was easy to assemble the pieces but the materials and their characteristics were not appropriate. Moreover, the end product was much too stiff and descriptive and did not meet the needs of the potential customers who answered the questionnaire and the design specifications.



Pictures 44: second phase of the design-cardboard



Pictures 45: second phase of the design-wood

### Product design

The third and most significant part of our process was to simplify the design of the product, and experiment with different material that would increase its aesthetic value. For that reason, we tried to redesign the model and make another proposition for the souvenir. We simplified the lines and defined the role of each piece. Another design method that was being used for the first time in this last prototype, was to include a subtle reference to all the features of the Arch of Galerius which make it recognizable to the visitors. These features became slots and pieces that would fit inside them in order for the structure to be accomplished. That meant that the location of the slots was selected not only to maintain the structural integrity of the

object, but also to provide a reference to the original monument. In order to fulfill the purpose of creating a product of high aesthetic value, that would not cost a lot of money and would set up a long lasting relationship with the buyer, we decided to choose a more transparent material, plexiglass, which would match the minimal design design intention and would result in a small artwork that would easily fit in every household.
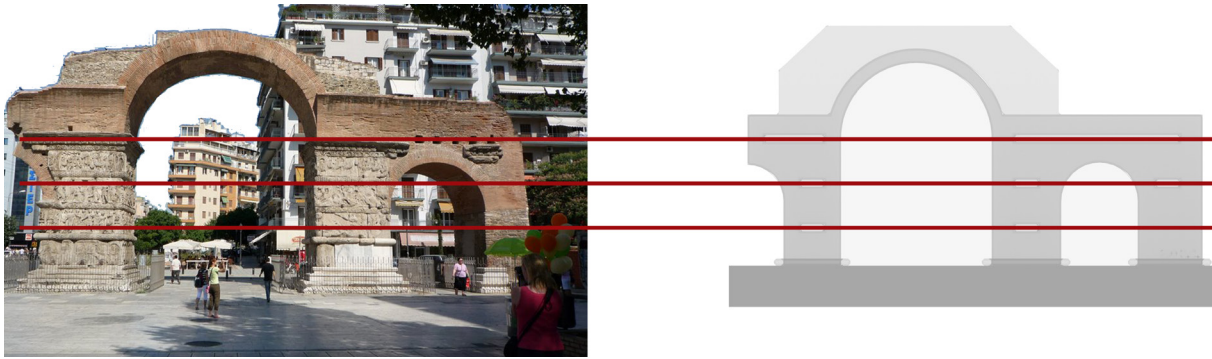


Pictures 46: reference to the features of the Arch

The decision to recreate the architectural model in transparent material also carries a symbolic meaning, of looking through the material and into the history of the city, renegotiating the boundaries of old and new. With regards to structure, the architectural model employs the technique of stratification-layering, a common methodology in digital fabrication. This articulated layered composition combines elements in two major directions that interlock and stabilize the model. As a conceptual approach it relates to an understanding of Eisenman's doctrine (2007) *"to consider the layers of physical and cultural archaeologies at each site"*.

A similar theory belongs to Rowe & Slutzky (1982), who mention in their article that there exist more than a single mode of transparency  that is, not only is there a physical or literal transparency, that is, an actual or real transparency, but also a conceptual or phenomenal transparency. As a result, the 3D puzzle achieves a double role, to intrigue the solvers on multiple levels, an actual one and a visual one. The actual puzzle relates to the construction of a 3D form with 2D elements that are being combined in the right way while the visual one relates to the perception of transparency as described by Kepes, *"if one sees two or more figures partly overlapping one another, and each of them claims for itself the common overlapped part, then one is confronted with a contradiction of spatial dimensions. To resolve this contradiction, one must assume the presence of a new optical quality"* (Kepes, 1944).
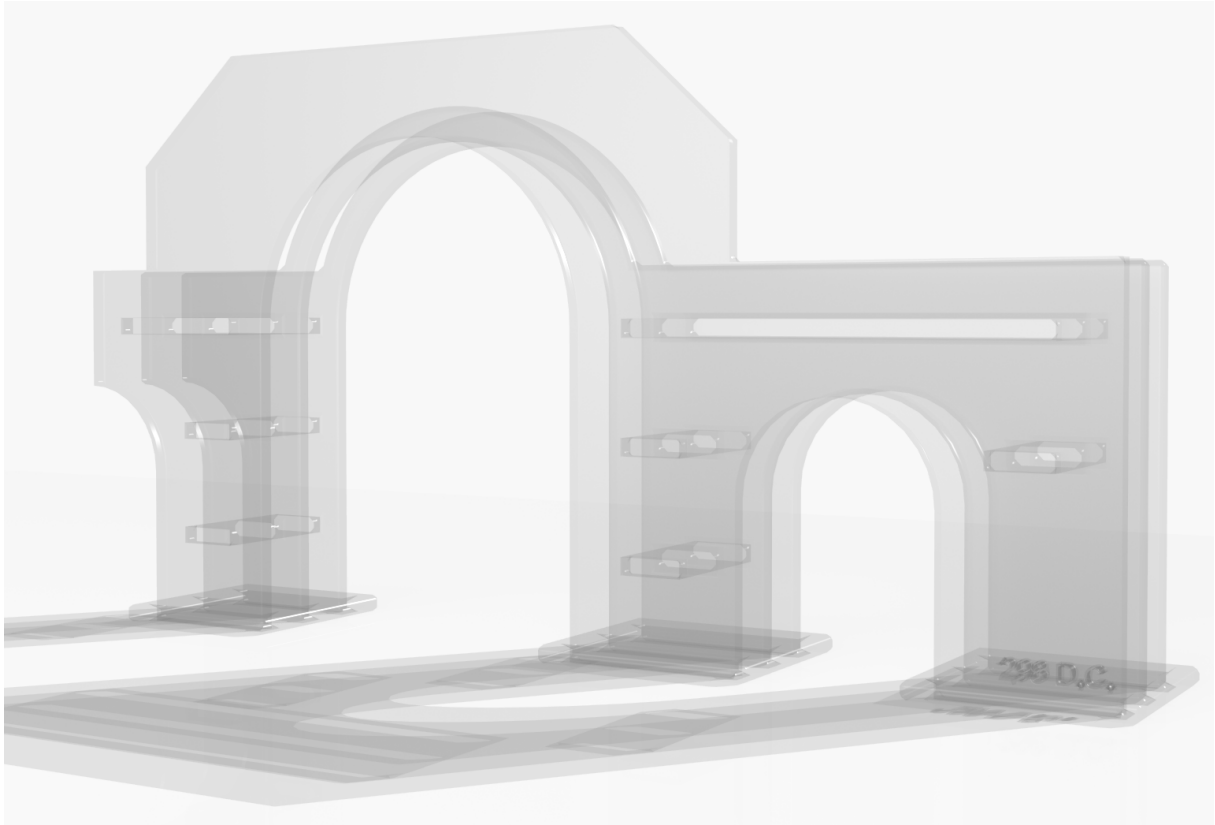
298 D.C.
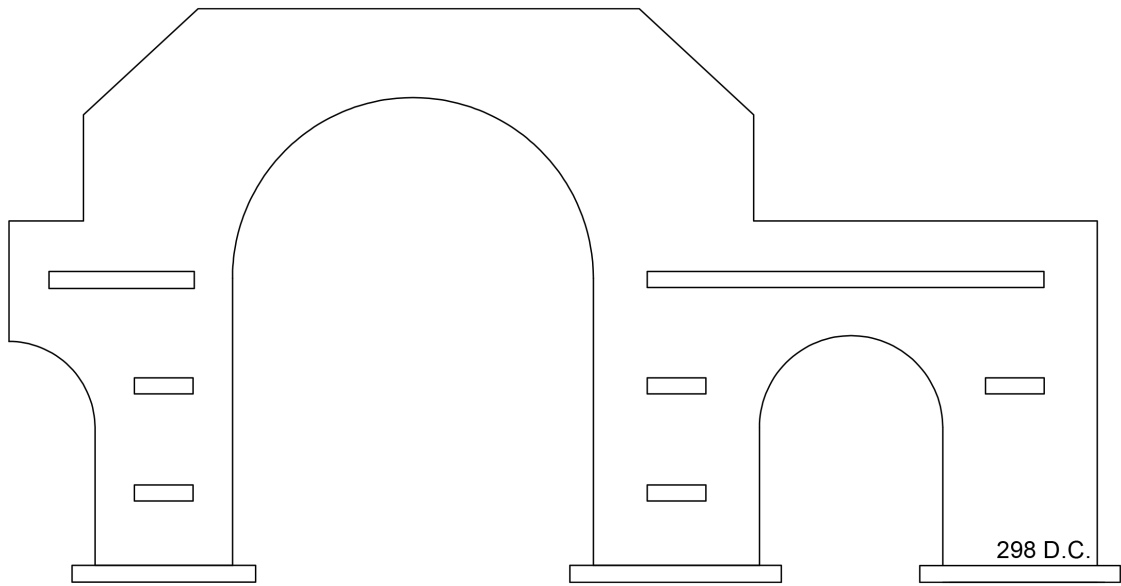
Pictures 47: front view of the new 3D puzzle
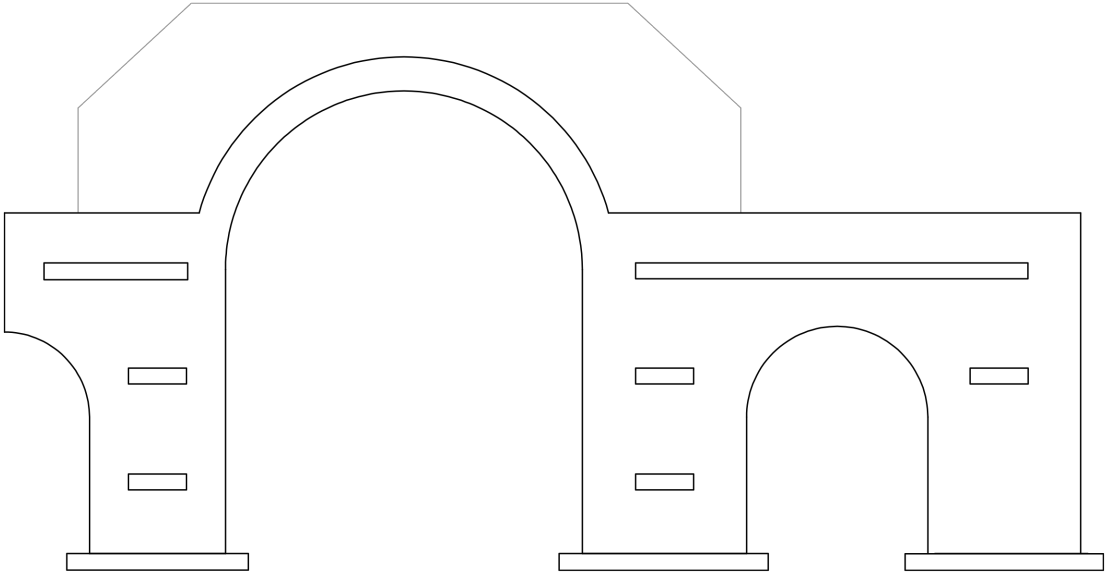
Pictures 48: back view of the new 3D puzzle

Pictures 49: photo of the real product

Pictures 50: perspective view of the new 3D puzzle



Pictures 51: rendered view of the new 3D puzzle

**Packaging**

In order to conclude with our design proposal and suggest a new product in an integral manner, we were very concerned with the packaging of the object, which needed to fulfill a series of criteria, as described below. Packaging is the science, art and technology of enclosing and protecting products for distribution, storage, use and sale. It refers to the process of design, evaluation and production of packages and can be described as a coordinated system of preparing products for transport, warehousing, logistics and use. Thus, we decided to design the package of our new 3D puzzle souvenir line that can be combined with the uniqueness of the landmark's souvenir design. First of all, one of the most important characteristics of the package are its size and shape. In order to minimise the volume as it is important to be carried easily, we designed an orthogonal package which is 10.95 cm width, 21.85 cm length and 1 cm thickness. It is a sliding - folding package, easy to use and understand how it opens as we designed an arrow to show the way it opens. Secondly, each landmark package has at the bottom a small text that give all the important historical information about the monument, a map which shows its position in Thessaloniki and at the upper side has a graphic sketch and the name of the monument. Last but not least, in order to be more clear the way that the puzzle is solved, the puzzle is divided into three layouts. This decision was also important, because it helped us to minimise the dimensions of the package and make it right in terms of stackability. Pictures 51 and 52 show the DWG drawing that was needed in order to create the package.
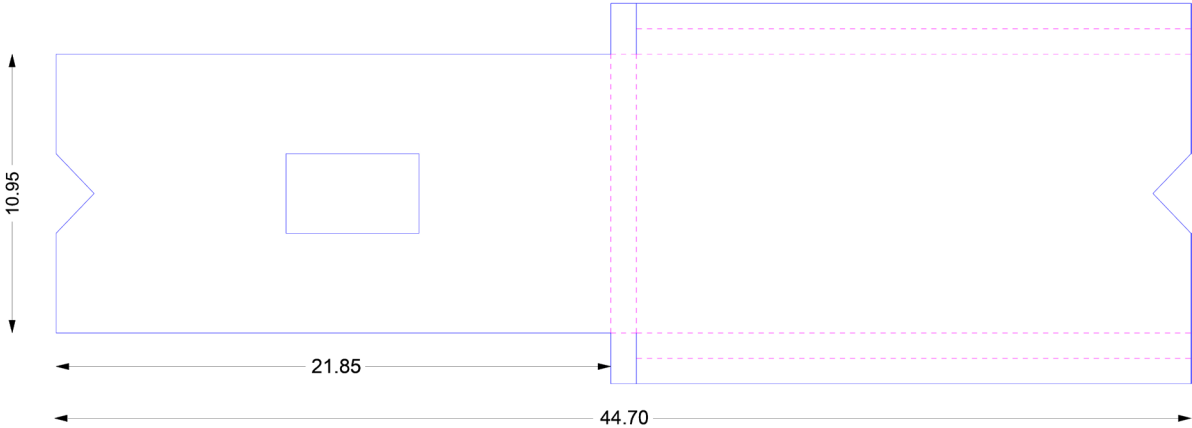


Pictures 52: dwg drawing for the package

14.77

25.65

Pictures 53: second dwg drawing for the package

10.95

Arch of Galerius
Landmark revisited
Thessaloniki

27.60
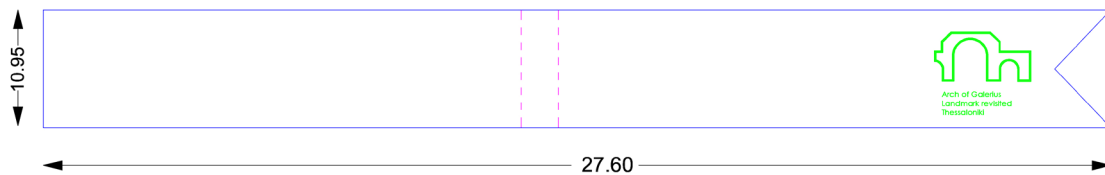
Pictures 54: third dwg drawing for the package

According to the study of marketing, our packaging design follows the five main features of a good packaging:

- The packaging should be convenient. The 3D puzzle souvenir packaging can be handled easily by everyone and is convenient for retailers to keep it in shop because of its small size. Moreover, our package is reusable and it is very important because it can be used from the consumers for other reasons as small storage of things.

- The packaging should be attractive. We tried to design a minimal dichromate packaging with little graphics to present the monument. The package contains all the necessary information on the front and the back.

- The packaging should be economical. The material that is used for the souvenir packaging is paper and is a low cost material. Moreover, the package can be cut flat for mass production or laser cut for prototypes and then folded, which means that can achieve the required quantity depending the need of the market.

- Packaging should be protective. The recyclable paper material can be protective and can not be damaged easily because of its hardness quality and thickness. Moreover, this packaging is stackable as it can be stored easily.

- The packaging should be communicative. The souvenir packaging is an open-close system that contains the information on the monument that every tourist should know for the monument that he has visited. The minimal design can constitute an interesting branding for the city and develop an effective advertisement.
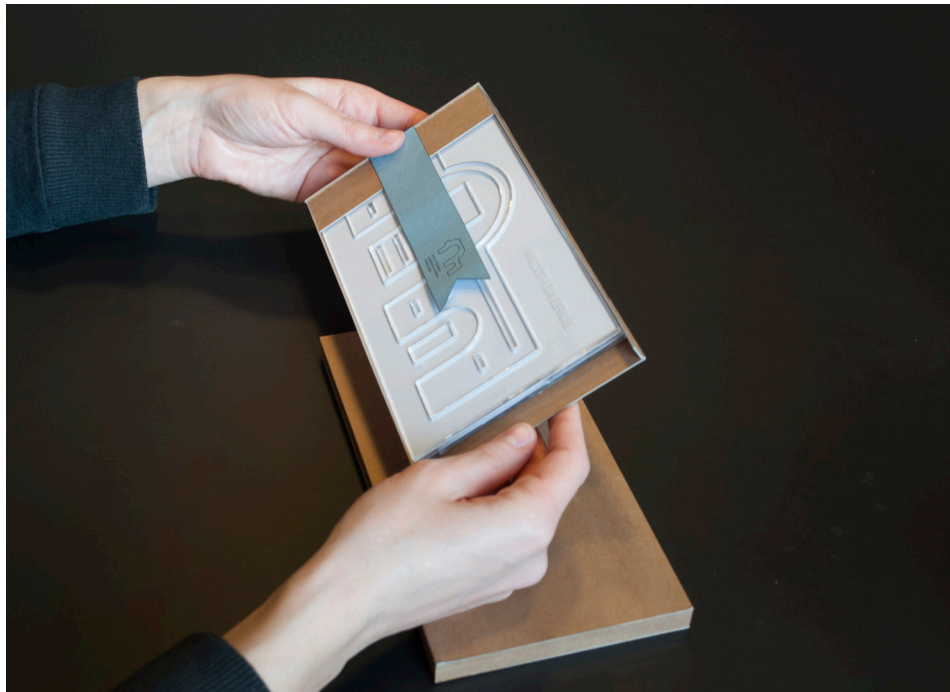
In the pictures that follow there is a sequence of the steps that the buyer - visitor should make from the moment that he holds the product until the accomplishment of the 3D puzzle.
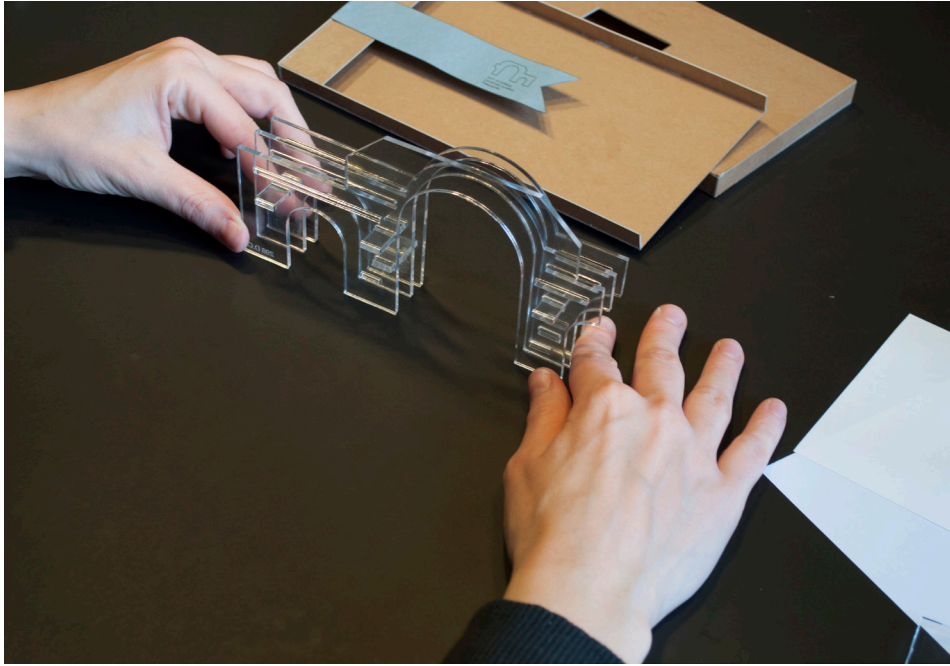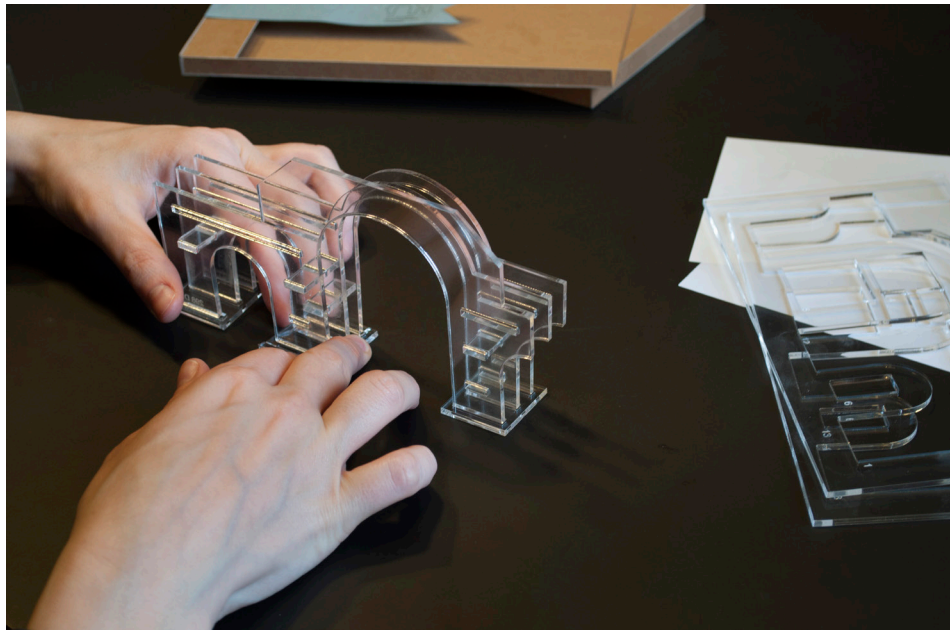


Pictures 55: first step of the process

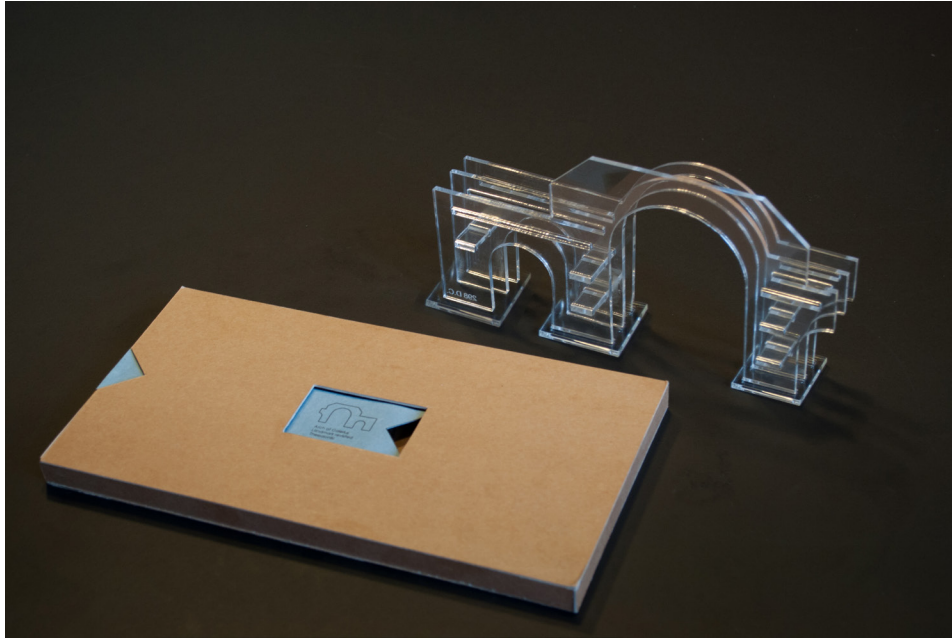Pictures 56: second step of the process



Pictures 57: third step of the process

Pictures 58: forth step of the process



Pictures 59: fifth step of the process

Pictures 60: last step of the process

## Closing remarks and Conclusions

The mid-20th century tourism industry has developed to a key sector of national and local economies creating chances of development for locals, entrepreneurs and sector employees. Cities as leisure vacation destinations have nowadays become a contemporary phenomenon where tourists can get familiar with local activities and everyday life.Thessaloniki, the second bigger Greek city has all the potential of becoming a city vacation tourism success story. Although the city seems able to use its strengths to compete in the European city destination market, Thessaloniki's performance is relatively substandard. A surprising fact considering that development perspective, it is clear that Thessaloniki is extremely rich in cultural and historical heritage assets.

There are several opportunities for the town to explore in order to improve its tourism performance, such as the evolution of the souvenir market.That's why it is essential to invest in new lines of souvenirs which will be indicative of the modern character of the city, while also combine the historical monuments. There is a need of change in order to develop the city branding and the city's tourism because each visitor searches for something unique, educational and aesthetically pleasing. The new line that is presented in this dissertation, can constitute the beginning for original designed souvenirs which represent recognised monuments of the city. These souvenirs could be attractive for the tourist to buy, because their morphology is recognizable by everyone and also each product gives the impression of a piece of art because of its minimal design and the transparent material. This new souvenir type fulfills the needs of the tourists in terms of finding something both unique and multifunctional to buy. Each souvenir is a innovative 3D puzzle which has to be solved in order to create the monument that is represented. The final product that you get from this puzzle can be used as a decorative product because of its design. Furthermore, these 3D puzzle souvenirs can be bought and solved by people of all ages as they are amusing, educational and creative for everyone. In each package there are instructions and a small history for the monument in order to remember your visit in Thessaloniki. Moreover, the line that we propose, offers the a fresh view and aesthetic value unlike the existing old - fashioned souvenirs. It combines a high quality with a relatively low cost, which might even be further reduced if the product

would be optimized for mass production to meet the market needs. Thessaloniki is in need of a new identity, the proposed new line of souvenirs aims to provide an image that will be able to represent both the city's turbulent history, as a mosaic of civilizations, as well as its contemporary culture, as one of the developing cities in Europe. In conclusion, Thessaloniki's profile fits with what city visitors demand from such a destination, whether they travel for holidays or for work. Development of specialized products for specific market segments of this travel mode would probably captivate an adequate market share. Building a strong brand and proposing a competitive product design may be the next step.

## Bibliography

Abendroth L., (2011). *The souvenir purchase decision: effects of online availability*, International journal of culture, tourism and hospitality research, Vol. 5

Andersen G., Ahdell, R., (2002). *Games simulation in corporate e-learning*. Master thesis, University of Illinois

Anderson L., Brown, P., Littrell, M, (1993). *What makes a craft authentic?*, Annals of tourism research Vol 20, Pergamon Press Ltd., USA

Avlonitis K., (2013) *City branding, citizens' participation in the identity formation of the city, the case of Ierapetra,* diploma thesis, Technological Education, Institute of Crete, Greece

Baker S., Bowen, H., Kleine, S., (2006). *On the symbolic meaning of souvenirs for children,* Research in Consumer Behavior, Vol. 10

Boylston S., (2009). *Designing sustainable packaging*, Laurence King Publishing, London, UK

Brand M., (2015., *No easy puzzles: Hardness results for jigsaw puzzles,* Theoretical Computer Science, Monash University, Australia

Cohen-Or D., Song, P., Wing Fu, C., (2012). *Recursive interlocking puzzles,* Tel Aviv University

Cormack R., (2000). *Byzantine art, Oxford history of art*, Oxford University press, New York

Costa J., Ferrone, L., (1995). *Sociocultural perspectives on tourism planning and development,* International journal of contemporary hospitality management, Vol. 7

Dogan, H., (1989). *Forms of adjustment: Sociocultural impacts of tourism,* Annals of tourism research, Vol. 16

Drensen P., Hansen, K., Nielsen, T., (2008). *Solving jigsaw puzzles using image features, Pattern recognition letters*, University of Copenhagen, Denmark

Dritsakis, N., (2004). *Tourism as a long-run economic growth factor: an empirical investigation for Greece using causality analysis.* Tour. Econ. 10

Eisenman P., "Terragni and the Idea of a Critical Text," (2007) in *Written into the Void: Selected Writings, 1990-2004* New Haven: Yale University Press,

Epaminontas Y., Stephanidis, I., (2012). *The westering orient Thessaloniki 1870-1912 the formative years*, Cultural foundation of national Bank of Thessaloniki

Fairham W., (2013). *Woodwork joints, how to make and where to use them*, Spon and Chamberlain, New York

Goodale M., Gonzalez, C., (2009). *Hand preference for precision grasping predicts language lateralization, Neuropsychologia,* University of Western Ontario, London

Gordon B. (1986). *The souvenir: Messenger of the extraordinary, Journal of Popular Culture*

Guidice A., (2001). *The seven essentials of woodworking,* Sterling Publishing Co, New York

Hallgrimsson B., (2013). *Prototyping and modelmaking for product design,* Laurence King Publishing Ltd, London, UK

Hong J., Hwang, M., (2012). *Effects of cognitive style on digital jigsaw puzzle performance: a GridWare analysis, Computers in Human Behavior*, National Taiwan Normal University, Taiwan

Jimenez, I.C., Ortuno, M.A., (2006). *The role of the tourism sector in economic development. Lessons from the Spanish experience* (Working Papers in Economics No. 158), Universitat de Barcelona,  Espai de Recerca en Economia.

Kepes G., (1944). *Language of Vision,* Chicago

Kotler P., Asplund C., Rein I. & Haider H.D. (1999). *Marketing Places Europe: Attracting Investments, Industries and Visitors to European Cities, Communities, Regions and Nations*, Harlow: Financial Times/ Prentice Hall.

Laxson J., (1991). *How we see them: Tourism and native Americans,* Annals of Tourism research, Vol. 18

Leeuwen, J., Timmermans, H., (2006). *Innovations in Design Support Systems in Architecture and Urban Planning*, Springer, Netherlands

Nomikos, M., (2001). Restoration-Rehabilitation of monuments and and historical buildings in

Northen Greece, Vol.2, Ergon

Rowe, C. & R. Slutzky, (1982). Transparency: Literal and Phenomenal, *The mathematics of the ideal villa and other essays*, Cambridge, Mass., MIT Press

Sato H., *The complete Japanese joinery*, Hartley and Marks, USA.

Seike K., (1977). *The art of Japanese joinery*, Weatherhill, Boston.

Sun T., Zheng, C., Computational Design of twisty joints and puzzles, Columbia University

Thompson R., (2007) *Manufacturing processes for design professionals*, Thomas and Hudson Ltd, London, UK

Torashichi Sumiyoshi,Gengo Matsui (1989). Wood joints in classical japanese architecture, Kajima Institute Publishing Co., Japan

***Internet references***

Akis Ikkos. (2015, February). The contribution of tourism the Greek economy in 2014 -imaging fundamentals. Retrieved from: http://sete.gr/media/3004/simasia_tourismou_sete_ intelligence_report

Branko Kolarevic. (2001). Digital Fabrication: Manufacturing Architecture in the Information Age. Retrieved from: http://cumincad.architexturez.net/system/files/pdf/81b8.content.pdf

Efrosini Tsakiri. (2016, January 15). Polis Painting. Retrieved from: http://www.citybranding. gr/2016/01/polis-painting.html?m=1

Elisavet Thoidou, Spiridoula Kakia, Maria Kouridou. (2015, November 10). Strategic spatial planning for the creative city: recent developments and the case of Thessaloniki. Retrieved from: http://www.citybranding.gr/2015/11/blog-post_10.html

Lisa Iwamoto. (2009). Digital Fabrications: Architectural and Material Techniques. Retrieved from: https://digitalfabrication.files.wordpress.com/2011/09/digital-fabrication_iwamoto1. pdf

Matthew Bloch, Phaedra Brown, Cynthia Collins. (2016, January 7). 52 Places to go in 2016. Retrieved from: http://www.nytimes.com/interactive/2016/01/07/travel/places-to-visit. html?_r=1

Paul Hekker. (2006). Design aesthetics: principles of pleasure in design . Retrieved from: http:// www.pabst-publishers.de/psychology-science/2-2006/06_Hekkert.pdf

Press office of San Francisco's Museum of Modern Art(SFMOMA). (2011, June 29). LESS AND MORE: THE DESIGN ETHOS OF DIETER RAMS. Retrieved from: https://www.sfmoma.org/ press/release/sfmoma-presents-less-and-more-the-design-ethos-of/

Scott Kim. (n.d.). What is a puzzle. Retrieved from: http://www.scottkim.com.previewc40. carrierzone.com/thinkinggames/whatisapuzzle/index.html

**Image sources**

Picture 1:http://www.scottkim.com.previewc40.carrierzone.com/thinkinggames/whatisapuzzle/index.html

Picture 2: http://www.learnnc.org/lp/multimedia/9445

Picture3http://jackofallhobby.blogspot.gr/2012/07/commuting-distractions-logic-puzzles.html

Picture 4: http://pix-hd.com/printable+difference+game

Picture 5: http://thebiggamehunter.com/mental-puzzles-mind-games/

Picture 6: http://www.anypuzzle.com/Jigsaw%20Assembly

Picture 7: http://smallpuzzlecollection.blogspot.gr/2014/08/vinco-packing-puzzles.html

Picture 8: http://smallpuzzlecollection.blogspot.gr/2014_05_01_archive.html

Picture 9: http://kubiyagames.com/3d-puzzles/interlocking-puzzles.html

Picture10:http://www.funnyordie.com/articles/84796820ba/teen-breaks-rubik-s-cube-world-record-warning-bras-aren-t-so-easy?_cc=S_d___&_ccid=wyj1hh.o0u80l

Picture 11: http://www.stlfinder.com/?search=tangram&page=3

Pictures 12-17: Torashichi Sumiyoshi,Gengo Matsui (1989). Wood joints in classical japanese architecture, Kajima Institute Publishing Co., Japan

Picture 19: http://www.skyscrapercity.com/showthread.php?t=1635543&page=3

Picture 20: http://www.inthessaloniki.com/en/heptapyrgion-yedi-kule

Picture 21: http://el.travelogues.gr/tag.php?view=5744

Picture 22: https://eistorias.wordpress.com

Picture 24:http://www.greece.com/photos/destinations/Macedonia/Thessaloniki/Ancient_Location/Thessaloniki/Hagia_Sophia_Thessaloniki_-_Selanik/4819233

Picture 26: http://www.exit210.gr/thessaloniki/poios-asbestwse-ton-leuko-purgo/

Picture 27: http://parallaximag.gr/thessaloniki/o-chartis-tis-polis-o-pirgos-tou-ote/

Picture28:https://commons.wikimedia.org/wiki/Category:Exterior_of_Museum_of_Byzantine_Culture#/media/File:Museum_of_Byzantine_Culture,_Thessaloniki,_Greece_(9168128342).jpg

Pictures 29, 30:https://www.eyath.gr/swift.jsp?extLang=&CMCCode=1020#../images/water_mouseio19zm.jpg

Picture 31: Nomikos, M., (2001). Restoration-Rehabilitation of monuments and and historical

buildings in Northen Greece, Vol.2, Ergon