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Abstract:

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This led to the vision:

"Imagine if different cultural preferences for lighting could be identified and presented, to increase knowledge and understanding of how to include them in the process of lighting design."

Based on this, research was conducted, and a survey was created to get input from the public. With the help of all the data and knowledge that was collected, a proposal for a website with this information was made. Helping to identify culturally significant aspects of lighting that can be a help for lighting designers around the world.

CULTURAL PREFERENCES FOR LIGHTING

Palmkvist & Brodersen

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Abstract

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CHAPTER 1

1.0 Introduction

This paper will investigate cultural preferences for lighting in, Northern Europe, the Middle East and East Asia. It will explore the cultural aspects of multiple countries and their impact on lighting design. Furthermore, an analysis of the differences and similarities will be conducted to determine critical factors that can lay the ground for a new tool/guide within lighting design.

1.1 Personal Motivation

The topic for this thesis is something very motivating. It is not always easy to navigate the ever-changing world, globalisation, and multiculturalism respectfully and mindfully. Working with and designing light from a viewpoint shaped by Scandinavia and the Nordic countries is a good foundation, but there are so many more cultures and aspects to light design that could change the way we perceive the world around us. Studying a subject in English in Denmark with classmates from all around the globe also opened the door to how light dessign is approached. Working with different people from around the world every semester was a fun challenge. It provided an example of how it might be working in an international company, or just a different country—experiencing different viewpoints and new ways to approach projects sparked an interest in how culture shapes our world, light and how it changes from culture to culture. Investigating essential aspects of culture, in general, is not always the easiest, but studying lighting culture is even more challenging. Creating this thesis showed that there is little in the way of extensive research about the effect of culture on lighting. This also brings us back to the topic of this paper. The aim was to understand how lighting around the world is shaped by culture. Having something that could help adapt to any lighting culture sounded like something worthwhile. Knowing lighting can't be the same everywhere, culture seemed to be a force of significant influence. Thus, the interest in exploring it and connecting it to lighting design was identified.

CHAPTER 2

2.0 Background

The reasons behind the differences in lighting design around the world are many. This chapter will describe some of these various factors in the aim of contributing valuable understanding of this paper´s topic.

2.1 Perception and understanding of light in different

There are various factors why the perception and understanding of light can vary in different regions worldwide. For example, the way lighting is designed for religious spaces such as churches and mosques could differ vastly. The paper *"Lighting Guide 13: Lighting for places of worship"* explains that the architecture of churches and mosques is based on and designed for how people of the different religions pray. A typical way of creating a Christian church is with an audience facing an altar in the front with the lighting facing forward and upwards towards the altar.

A mosque usually consists of several rooms located around a central prayer hall that can include courtyards and fountains. Instead, the lighting is usually focused around the prayer hall of a mosque (Holmes et al., 2014).

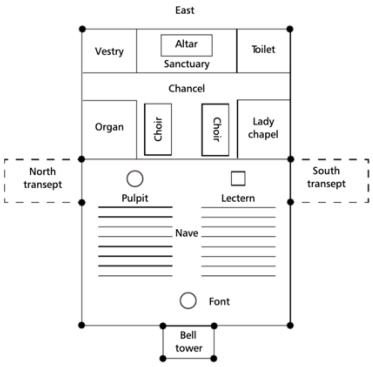

Figure 01. (Holmes et al., 2014)

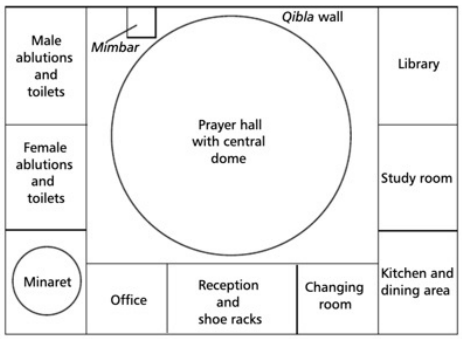

Figure 02. (Holmes et al., 2014)

Environment and location also play a large role in the architecture of cities and buildings. For example, in Northern Europe, where there are only 3-4 months of summer and an overcast sky for the rest of the time, people spend a lot of time indoors. Therefore, the windows are designed to let as much sunlight in as possible. Scandinavian homes usually are designed with big open windows without any shading alternatives. When comparing this to Southern Europe, the architecture is designed almost the opposite way from Northern Europe. Southern Europe has a much warmer climate, the people living in this part of the world spend most of their time outdoors and their homes are designed with smaller windows and shading alternatives (Seghi et al., 2017).

Except for creating homes differently depending on the amount of sunlight and daylight exposure people get in different climates around the world, the altitude also plays a significant role in the sun's intensity. If the sun's altitude increases, the power of the light increase; this is, for example, why it's much brighter in Rome throughout the year compared to Copenhagen, because the altitude in Rome is much higher (Zennaro & Università Iuav di Venezia, 2010).

Other than how architecture and various places are designed depending on and creating culture, there is research proving cross-cultural differences in perception. The paper "*Cultural Differences in Allocation of Attention in Visual Information Processing"* says that "They demonstrate that East Asians are better than Americans at detecting colour changes when a layout of a set of coloured blocks is expanded to cover a wider region and worse when it is shrunk". East Asians are also slower than Americans at detecting changes in the centre of the screen. The data suggest that East Asians allocate their attention more broadly than Americans".

When combining the impact of religion, architecture and design of windows, time spent outdoors versus indoors, the sun's altitude, and the possibility that there can be cultural differences in how the spaces around us are perceived, the perception and understanding of lighting in different regions alters.

2.2 Defining Lighting Culutre

It must be clarified that culture in the context of this paper is not connected to work or online culture. Regarding the topic of this study, culture is shared by the population of a country or region that shares the same values. The reason for this definition of culture is connected back to lighting design. Culture shapes and influences the way we navigate and live within a culture.

Different ways of defining culture:

- To get a general understanding of how culture could be described, one can look at the term "Leitkultur" (leading or guiding culture), which is a term coined by Bassam Tibi. Leitkultur is based on western liberal values such as Democracy, laicism, enlightenment, human rights and civil society. (Tibi, 2000)

- The way culture is described, is something that changed drastically over the last seventy years. Thomas Stearns Elliot for example wrote in his book *"Beiträge zum Begriff Kultur" (Contributions to the concept of culture) that culture is „die Gesamtform, in der ein Volk lebt - von der Geburt bis zum Grabe, vom Morgen bis in die Nacht und selbst im Schlaf."* (Elliot, 1949)

- Ludwig Wittgenstein defined culture as existing where people have a shared life practice or culture exists where people get along with each other. (Wittgenstein, 1949)

- Someone who has a similar understanding of culture is Stefanie Rathje. In her journal article, The Definition of Culture: An application-oriented overhaul, Rathje states, “Culture begins, therefore, where people interact in groups. It ends with the characteristics of the individual.” (Rathje, 2009)

- Culture is something that can’t be categorised as coherent. This is, of course, because the world is changing and because circumstances can change very fast. Jan Assmann wrote in his book *Das Kulturelle Gedächtnis* about the concept of “cultural memory”. (Assmann, 1992). Assmann describes this memory as a resource, a heterogeneous collection of knowledge. This knowledge is then used when needed in circumstances of change or adaptation.

Culture is something that few times are only defined with one thing; a famous saying is “culture is the way of life for an entire society”, which then includes codes of manners, dress, language, religion, art, norms, and behaviour, such as law and morality and systems of belief. Many of these factors change throughout time as societies change. The first thing that can be concluded is that 1. Culture is inconsistent, 2. Culture is based on the way people live, taught from generation to generation, 3. Culture ends with the characteristics of an individual.

Moving on from defining culture, it is now time to combine culture and lighting and explain how the authors of this paper define lighting cultures. The authors define Lighting Cultures through the relation between several geographical positions and daylight, sunlight, and electrical lighting. The authors are limited to only research about colour temperature and intensity of cultural preferences. First, research about different lighting cultures from around the world was conducted, which led to a specification of three lighting cultures; Northern Europe, the Middle East, and East Asia.

Defining cultural significant aspects and differences will provide a groundwork that supports lighting design in a way that will be most suitable for the given culture. While there are no direct rules or guidelines for lighting arising from culture, it shapes how the general population in a particular culture prefers their lighting. After defining how lighting and culture can be blended together the next chapter will be introducing the three lighting cultures that were set to investigate Northern Europe, the Middle East, and East Asia.

2.2.1 Lighting Culture of Northern Europe

Northern Europe is the part of Europe located north of Central Europe. According to FN, the following territories are Northern Europe: Denmark, Estonia, Latvia, Lithuania, Finland, Island, Ireland, Norway, Sweden, and United Kingdom (see figure 03).

Figure 03. (freeworldmaps, 2021c)

Northern Europe is known to experience all four seasons, winter, spring, summer and fall, while fall-winter are the seasons that reflect Northern Europe the most. This means that the weather conditions in Northern Europe usually have an overcast sky, which means that on an average day, not in summer, the sky is 95% obscured by clouds, letting no direct sunlight through but still keeping the intensity of the light very high. This is because the cloudy sky characterises as a large illuminating surface covered from the horizon to the zenith (Mathiasen, 2016). Northern European countries' natural light is vastly different from other countries worldwide (see figure **). This is because the countries in the north have a very low solar angle throughout the year, long periods of twilight and frequent overcast skies. This explains that the geographical and climate factors play a significant role in the illumination of the ground, daylight, colour, landscape, architecture, and people (Seghi et al., 2017).

Stockholm, Sweden. Sunrise, sunset, dawn and dusk times, graph

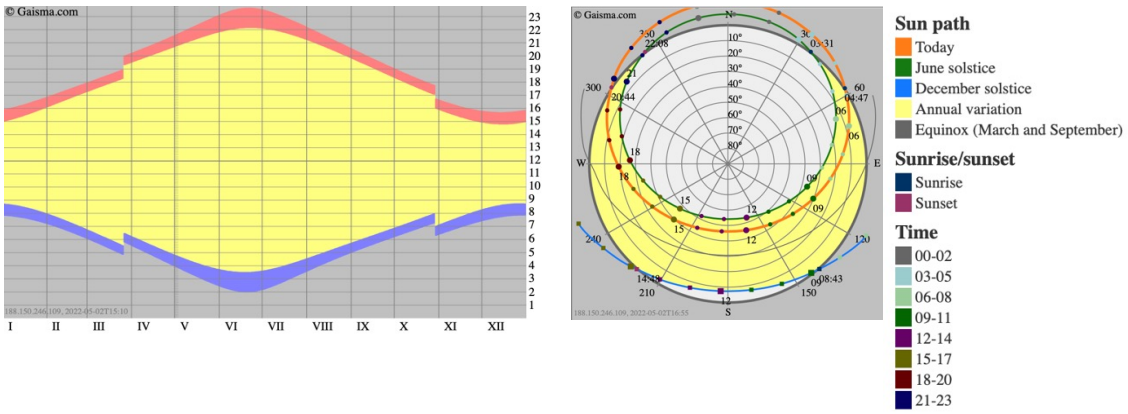

Figure 04. (Gaisma, 2002)

Northern Europe is known for its long periods of dusk and dawn. The transition between day and night gives incredibly unique colours in the sky. The lighting in Northern Europe helps people to grasp and appreciate the dynamics of colour temperature and the careful utilisation of coloured lights. These colours usually go from yellow, orange, pink, purple, and red, meaning that a lot of the people living in this part of the world tend to design their homes with a lot of warm colour temperatures with sometimes a very low-intensity (Seghi et al., 2017).

2.2.2 Lighting Culture of The Middle East

The Middle East refers to the region spanning the Levant, Arabian Peninsula, Anatolia, Turkey, Cyprus, Egypt, Iran, Iraq, and Saudi Arabia. It is the land around the southern and eastern shores of the Mediterranean Sea. Historically, it was also known as the Near East but has been renamed by more modern Western geographers.

Figure 05. (freeworldmaps, 2021b)

When comparing the Middle East to Northern Europe´s climate it is easy to spot a significant difference. As mentioned before, Northern Europe stands for a somewhat colder climate with an overcast sky and not a lot of direct sunlight. When looking at the Middle East´s climate which is known for its heat and humidity, and due to the geographical position, always has very high solar angle providing a lot of direct sunlight, the two different cultural areas look very different from one another. Light carries a significant meaning to the Islamic and Middle East cultures, God (Allah) is described in the Quran as “The light sources of heavens and earth”. Light also stands for a lot of positive values as opposed to the negative values of darkness in the Middle Eastern culture. During the daytime, the natural light tends to be often used as the main source of light in buildings in the Middle East, although with the alternatives of shading possibilities. Therefore, electric lighting is also very important, especially during the evenings. The transmission from day to night for this part of the world is usually short and therefore the electric lighting is much needed during the evenings. Other cultural values such as privacy and gender segregation are very reliant on natural and electric lighting (Mahgoub, 2011).

Dubai, UAE. Sunrise, sunset, dawn and dusk times, graph

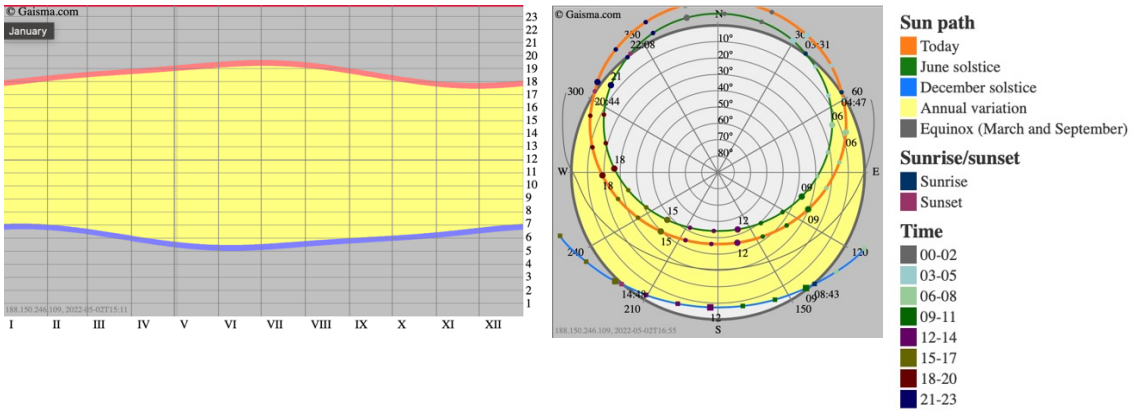

Figure 06. (Gaisma, 2002)

Regions in the Middle East such as the United Arab Emirates have a very different view of designing with lighting. Compared to Northern Europe where there is a lot of focus on keeping the light levels down and avoiding glare, the lighting design in Dubai, for example, is vastly different. Here there is a lot of light, and the glare is not always thought of.

Figure 08 shows a light pollution map across the world, it is noticeable that the Middle East stands for one of the most light-polluted areas in the world.

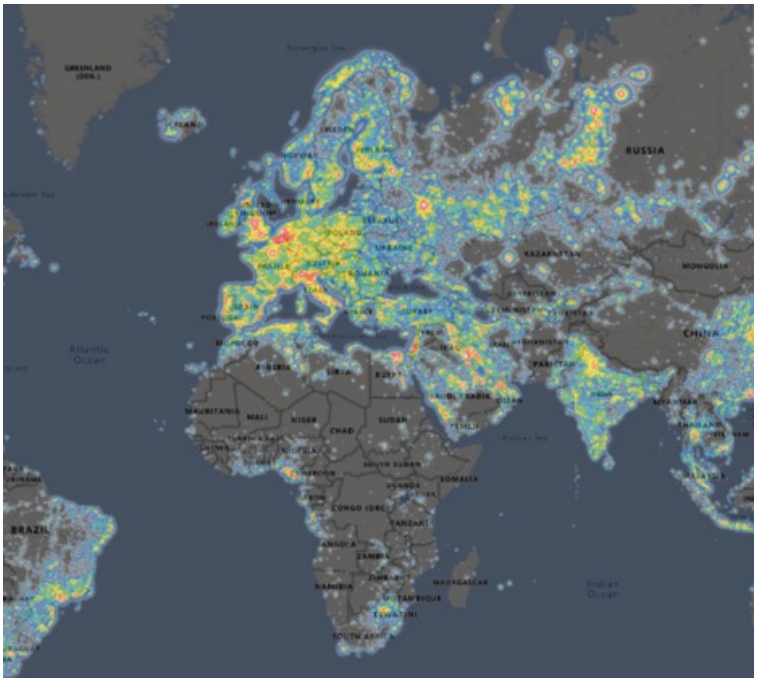

Figure 07. (lightpollutionmap.info, 2022)

2.2.3 Lighting Culture of East Asia

Asia, which is used more as a geographical term than a homogeneous continent, holds the highest diversity in cultures. East Asia, which is a part of Asia, holds almost 22% of the world's population. Countries that are a part of East Asia include China, Japan, Mongolia, North Korea, South Korea, and Taiwan.

Figure 08. (freeworldmaps, 2021a)

The climate of East Asia is very interesting as it varies from bitter cold in the winter to unbearable heat in summer. China´s climate can be categorised into dry seasons and wet seasons. In winter it is cold and dry which is made by northern winds from higher latitudes, and during summer, extremely warm and humid winds come off the coast from lower latitudes. The sun's path is similar to the Middle East's, this is easily explained by the location of these two regions, they are almost located at the same latitude. This means that there is a lot of direct sunlight during the day and shorter dawn and dusk transitions than in Northern Europe, this of course indicates the importance of electric lighting.

Shanghai, China. Sunrise, sunset, dawn and dusk times, graph

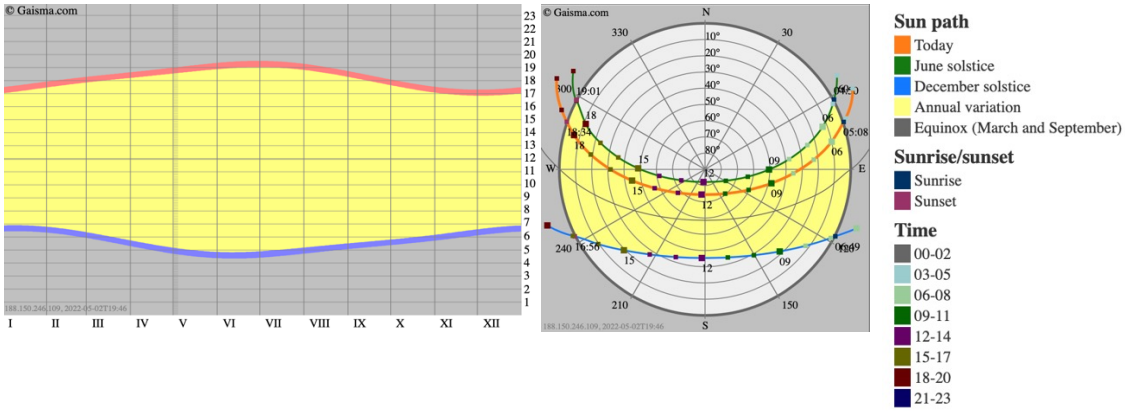

Figure 9. (Gaisma, 2002)

One aspect that has an extensive impact on the perception of lighting is the usage of colour. Colour has a great impact on East Asian culture, especially Chinese culture. Colours that are very common in Chinese culture are cyan, yellow, red, white, and black, these are called the “five colours”; all these colours also have the symbol of positivity.

More specifically, the colours green, yellow, red, white, and black are very common in the Chinese lighting design culture. With colour, it is possible to support the style of lighting and with that reflect its cultural value. The East Asian lighting culture varies from the other two previously mentioned cultures as East Asian lighting culture plays with a lot of colours whereas Northern Europe stands for the very warm lighting conditions and the Middle East, somewhat in between the two (Zhao, 2022)

2.3 Cultural Preferences in Lighting Design

Going into another perspective of the different lighting cultures is the professional point of view. What does the actual lighting design look like in the different regions?

2.3.1 Cultural Lighting of Northern Europe in Lighting Design

The northern part of Europe has always been extremely good at design, with an incredible sense for high quality that looks very appealing. There is no exception with lighting design. For example, the Scandinavian architecture and interior design are highly known for their minimalistic and functional approach, and the lighting design of Northern Europe reflects this very well (Seghi et al., 2017). Looking at the Nordic countries lighting awards over the years, Northern Europe stands for a typical minimalistic and modern lighting design. Below are the winners of the different lighting awards in Norway, Sweden, and Denmark 2018. Besides being minimalistic and modern, the lighting design also reflects the daylight of Northern Europe. Nanet Mathiasen explains in her article "*Nordic Light and its Relation to Daylight Apertures in Nordic Architecture*" that architects often aim to manipulate the light, and explains how the design of a dominant, large, diffuse light from the sky has been applied in many designs (Mathiasen, 2016). The Royal Danish Academy describes how Nanet Mathiasen explains it in her article about how "Architects utilise Nordic light to its full effect, enabling the light to support the function of the room, whilst simultaneously creating an evocative and intimate atmosphere".

Figure 10. (Lyskultur, 2018)

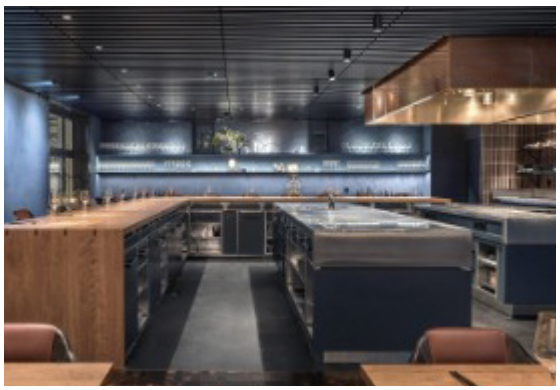

Figure 11. (Rokka, 2018)

Figure 12. (Dansk Center for Lys, 2018)

2.3.2 Cultural Lighting of The Middle East in Lighting Design

As explained in the previous definition of the lighting culture in the Middle East, it is especially connected to the religion of the region. This means that the lighting design of the Middle East tends to be known as bright, this is because light carries positive values as opposed to negative values in the Islamic religion. The lighting design in the Middle East tries to work with the daylight as much as possible, mostly in traditional environments such as courtyards, mushrabiyas (balcony windows in Arabic structure), and lighting wells. While using a lot of daylight when designing in the Middle East, a big factor that is connected to light is the architecture. In the Middle East, tall buildings are seen as something that radiates pride and identity. Wanting to emphasise this, there is high attention to lighting these architectural structures. Down below are three winners of the Light Middle East Award 2021 (figure 13, 14 & 15).

The exterior lighting design is a way of enhancing the manifestation of Middle Eastern culture at night (Mahgoub, 2011). Harshita Shetty describes in her dissertation paper the memories of the Middle Eastern natural sky observation as “the glow of the sky, the starry sky, setting sun…”. What Harshita Shetty is describing is closely considered in the lighting design culture of the Middle East (Shetty, 2016).

Figure 13. (Messse Frankfurt, 2021a)

Figure 14. (Messse Frankfurt, 2021b)

Figure 15. (Messse Frankfurt, 2021c)

2.3.3 Cultural Lighting of East Asia in Lighting Design

The East Asian lighting design culture, or more specifically the Chinese lighting design culture, started during the Eastern Han Dynasty (202 BC – 220 AD) and continues to this day. This type of lighting design is known for its application of graphics, especially in lampshades. The graphics can express the history and culture of certain areas; this is a great lighting tool to convey a story through design. A typical colour combination for lighting in China is black, white, grey, and red, the usage of colours and the meaning behind colours in China are frequently applied in the field of lighting design (Zhao, 2022).

What is also known from the East Asian lighting design culture is the usage of classic lighting fixtures, that communicate a great deal of history. Like the Middle Eastern lighting design culture, the East Asian lighting design culture also focuses a lot on exterior lighting. Facades are something that East Asia and Asia try to pay attention to. This can be seen when looking at the Asian lighting design awards from 2021 the majority of the winners exhibited amazing facades with breath-taking lighting design (see figure 16,17 & 18) (Zhao, 2022).

Figure 16. (aaldlighting, 2021a)

Figure 17. (aaldlighting, 2021b)

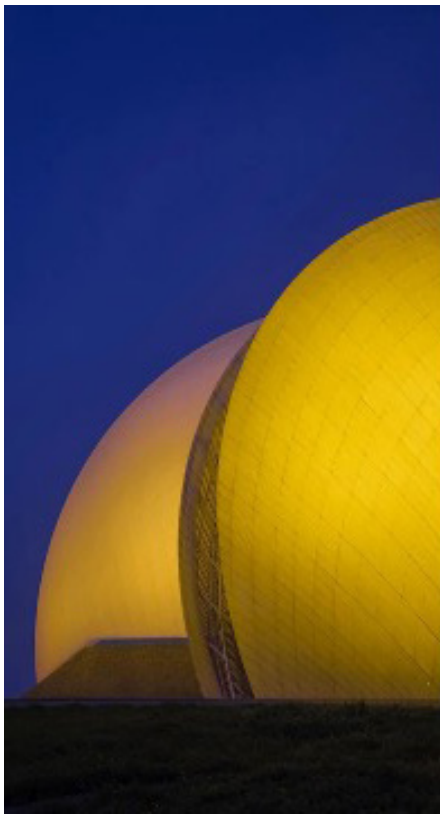

Figure 18. (aaldlighting, 2021c)

2.4 Conclusion of Background

With the help of research papers and articles, we can state that there is a cultural difference in the field of lighting design that affects the sensory experiences, inherited from generation to generation. Thus, always having a connection to the respective lighting culture influenced by the upbringing and society has an effect on how light is designed no matter where one is.
Even though there will always be a connection to the culture one grew up in, this does not mean that the lighting designer will always just work with his/her own culture. Working on projects far removed from one's culture means that the designer needs to get familiar with the respective culture and learn about it. To align the aim concept of a lighting design and its project it is crucial to obtain knowledge and understanding of different lighting cultures throughout the world.

CHAPTER 3

3.0 Method

This chapter will present which methods are used during this project. The project is mainly constructed by two different methods.

1. Original Research Method – Opinion Poll Survey
2. Research Method – Literature Review

The first method that was accustomed was the original research method. This method included an opinion poll survey. This was the first method used to shed light on the different lighting cultures from around the world. It was a way of acknowledging the importance of considering all types of lighting preferences and stating that lighting designers should contribute to presenting a more diverse understanding of lighting. After a lot of internal and external discussions, it was agreed to continue the investigation through a literature review. With the help of a literature review combined with the opinion poll survey, the aim of this paper is to offer recommendations on what to consider and what to avoid when working with different lighting cultures.

3.1 Overall Methodology for the Thesis

When approaching this project, the experiment design model was used to structure the development of a design, in this case, a design tool to use in the lighting design process. This design model includes the scientific fields of social science, humanities/art, and natural science. All three fields of science were used for this project, with a particular emphasis on social science and the humanities/art.

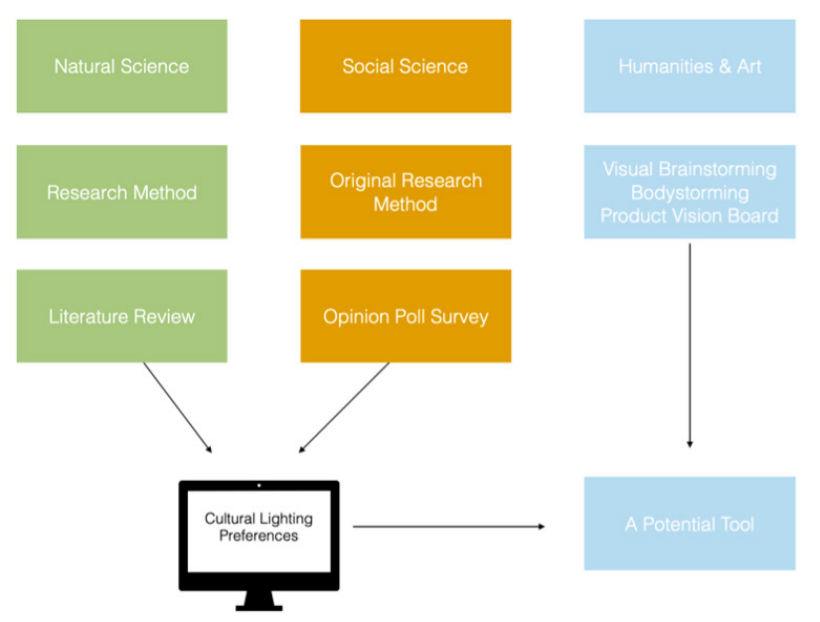

Figure 19. (Own Graph)

3.2 Original Research - The Survey

In the process of researching cultural differences in lighting, the authors decided to gather information with the help of a survey. A survey is a method in research that is often used to appraise thoughts, opinions, and feelings (Shaughnessy et al., 2012). But since there are a lot of different ways of conducting a survey, the right one needed to be chosen. After examination of all different surveys, it was decided that an opinion poll survey would yield the best results. An opinion poll is "*an activity in which many people are asked the same questions in order to find out what most people think about something"* (Merriam-Webster, n.d.). An opinion poll presented itself as the best option since data was needed that represented the same attributes in different areas around the world. After having found the right survey, it was researched how to best create a survey, what to do and what not to do. The website (*Create a Survey: Top 12 Tips to Create a Good Survey! | QuestionPro*, n.d.) presented itself as rather helpful with its 12 tips on how to create a good survey. (Figure 20)

Figure 20. (Create a Survey: Top 12 Tips to Create a Good Survey! | QuestionPro, n.d.)

While some of the steps were very useful, others didn't matter, such as offering incentives, sending reminders, or creating a progress bar.
Since the process of this thesis already started when beginning the survey, the purpose was clear and set. What do people from around the world prefer regarding lighting?

The next thing that needed to be considered were the questions that participants of the survey should answer. Questions asked should be as unbiased as possible and only one reference picture regarding CCT was provided. All questions of the actual survey will be provided later. Since the survey was not too extensive, a progress bar was not needed. While creating the questions for the survey, it was tested regarding how understandable they were, avoiding anything too complex for someone unfamiliar with the topic. When advised on how to create a consistent rating scale for the survey, it was made clear that the rating should be able to clearly swing to one or another side. All questions were created like this when possible, showing consistency in the survey and overall questions. After having tested how understandable the questions were, the whole survey was also tested before it was made public. The prior questioning about understandability helped and the survey did not have to go through any immense changes. The survey was distributed through social media and was set to last for ten days. A reminder for the survey was reposted through social media every third day. We did not offer incentives for the participants.

3.2.1 What Method was Udes to Analyse the Data

Analysing survey data can be done in multiple different ways. According to datapine.com, there are 10 essential methods of analysing data from a survey. ("What Is Data Analysis?" 2022) The method that fit the survey the best was the one called exploratory analysis. This method is applied after the survey is completed and the collected data is investigated. This investigation entailed the comparison of similarities and differences of different cultural preferences toward lighting in a public space. This method helped to find connections between the answers so that a hypothesis could be generated which assisted in the analysis and report of personal cultural preferences towards the lighting the participants of the survey live with.

3.2.2 Hypotheis

Working in a world that is interconnected and always changing comes with constant adaptation. Immersing into a culture one is unfamiliar with can be an intense challenge. Presumably not wanting to stand out from the crowd and being as respectful towards the culture as possible can be difficult when challenged all alone. As cultures are different around the world, lighting is as well. Researching cultures and their effect on lighting is something that will provide knowledge as to how to design the right lighting for the circumstances. While research can provide a lot of knowledge, the goal was to collect it and combine it into one tool. Compressing aspects of culture affecting lighting into a tool that can help adapt to a certain culture would provide help in establishing a foundation for knowledge about said culture. This would help the individual to adapt faster and avoid faux pas. This led to the hypothesis sounding like this:

Having a tool or collection of knowledge that can help to understand different lighting cultures can aid in the design of lighting around the world. This could be a help to avoid faux-pas and adapt faster.

3.3 Research Method - Litterature review

The second step of this project was to make a literature review. Broadly explained a literature review is a method of collecting and summarising previous research that is systematic. As a research method, an effective and well-conducted review establishes a solid foundation for progressing knowledge and providing theory development. A literature review can clarify research questions by integrating findings and perspectives from many empirical findings with the power that no scientific single study has (Patel & Davidson, 2011).

The aim of this literature review was to collect previous research that already investigated the topic of cultural preferences in lighting. The second step of the literature review was to make a critical overview of the various findings (Snyder, 2019). The literature review can be seen as a tool to produce new ideas within the same topic, analysing, and hopefully answering something that has not been done yet.

A literature review is done in 5 different steps:

1. Search for relevant literature on the chosen topic. In this context, literature means any academic sources, such as books and journal articles.
2. Evaluate and select sources.
3. Identify themes, debates, and gaps. While reading, pay attention to connections between different sources.
    - Things to look for: trends and patterns, themes, debates or contradictions, influential studies, and gaps.
4. Outline the literature review´s structure.
    - Four approaches to structure the literature review: Chronological, Thematic, Methodological or Theoretical.
5. Start writing, the literature review should contain an introduction, the main body that summarises and synthesises the sources, and then a conclusion.

3.3.1 Procedure of Litterature Review

1. When approaching the literature review, the first step was looking into similar research papers, trying to find relevant papers that were researching the topic of cultural preferences of lighting. The databases that the authors used the most were Science Direct and Scopus. Some of the main words that were used to find similar papers were “Culture, Lighting, Lighting Design, Preferences, Northern Lighting, Lighting of Middle East, Lighting in East Asia, Religion, Colour Temperature, Colour, Lighting in Asia”. Besides searching in several databases, the authors also looked at older thesis papers that had been written about culture connected to lighting, and from that sifting through the references of each paper to search for even more relevant studies connected to this topic.
2. The second step was to evaluate and select the sources that the authors wanted to analyse. This was done by comparing all the papers, mostly by looking at the different areas that were researched and how specific the findings of every paper were. The authors chose 8 papers
3. Thirdly the authors started to analyse these 8 papers, trying to identify the themes, debates, and gaps in all of them.
4. The fourth step was to look at the outline of every paper. The authors chose to structure the literature after the theme. From each theme identify which papers fit under which theme.
5. The last step is when the authors started to write the literature review.

The outline of the litterature review:

1. Introduction
2. Main Body (analysing the findings)
3. Conclusion

The chosen 8 papers:

1. Northern and Southern Lighting Cultures in Europe. Lighting Scenarios for the Indoor Living Spaces (Seghi et al., 2017)
2. Culture, Light and Latitudes: A comparative study of lighting conditions and habits in Brasilia, Berlin and Copenhagen (Moraes Rosildete de Olveira, 2018)
3. Cultural Differences in Allocation of Attention in Visual Information Processing (Boduroglu et al., 2009)
4. Innovative Design and Creation of Chinese Lighting Culture (Zhao, 2022)
5. Place and Space - Architectural Daylight Design in Traditional Housing in Northern and Southern Regions of Europe (Mathiasen, 2010)
6. Homely Atmospheres and Lighting Technologies in Denmark: Living with Light (Bille, 2019)
7. Lighting and Spatial Structure in religious Architecture: A comparative study of Byzantine church and an early Ottoman Mosque in the city of Thessaloniki (Antonakaki, 2007)
8. Mapping Danish Lighting Trends (Stidsen et al., 2014)

3.4 Developing a Tool

The name that the tool was given in the end was “A Lighting Design Tool for Recommendations to Different Lighting Cultures”.

This tool for cultural awareness towards lighting is something that can support the understanding of different cultures. Having access to information about lighting culture from around the world can support the designer to immerse themselves in the culture, and with that become a mediator between two cultures. (Likert, 1967). But this would not only mean that the designer can mediate. In her book *Unternehmenskultur als Interkultur (Corporate culture as intercultural),* Rathje describes how this could build a foundation for organisations to have a basic understanding of different cultures. (Rathje, 2004).

The aim of the tool is to present the knowledge and understanding of different lighting cultures in the world. How does the culture affect the lighting design and how can lighting designers use this information to mediate between several cultures when working in the design process of a new lighting design?

The methods that were used to create the recommendations for this tool were:

1. Visual Brainstorming.
2. Bodystorming.
3. Product Vision Board.

3.4.1 Visual Brainstorming

Visual Brainstorming is a technique that can be used to creatively solve problems. It means to displaying the thoughts and ideas of each problem that is trying to be solved. The tool usually tries to categorise thoughts and ideas into different hierarchies. Visual Brainstorming can be explained as follow:

1. Framing the creative challenge.
   - What features can we add to the design process?
2. Build and create new models (the tool).
   - Work with what the design process already consists of.
3. Present the different models that have been developed.

There are five main steps in the process of visual brainstorming:

1. The Title—this is where the problem is stated; what problem needs to be solved.
2. Ideation Phase—this is the stage where all ideas should be written down on paper. They do not have to be in any order. In this step, it also helps to keep in mind the needs regarding the issues that are trying to be solved.
3. Continue the Ideation Phase—this is where it's time to go back to all the ideas that have been brainstormed and to start writing down all thoughts that are connected to that idea; to think of what the needs can do towards the problem that is being solved.
4. Evaluation Phase—go through all the ideas and thoughts using colour, trying to find the elements that stand out.
5. Organisation of the Ideas—this step is all about summarising the visual brainstorming. This can be done with other visual tools or by continuing in the same place but being very organised. This step is to find out what works while also identifying to whom this will be presented.

Example of how a Visual Brainstorming can look like:

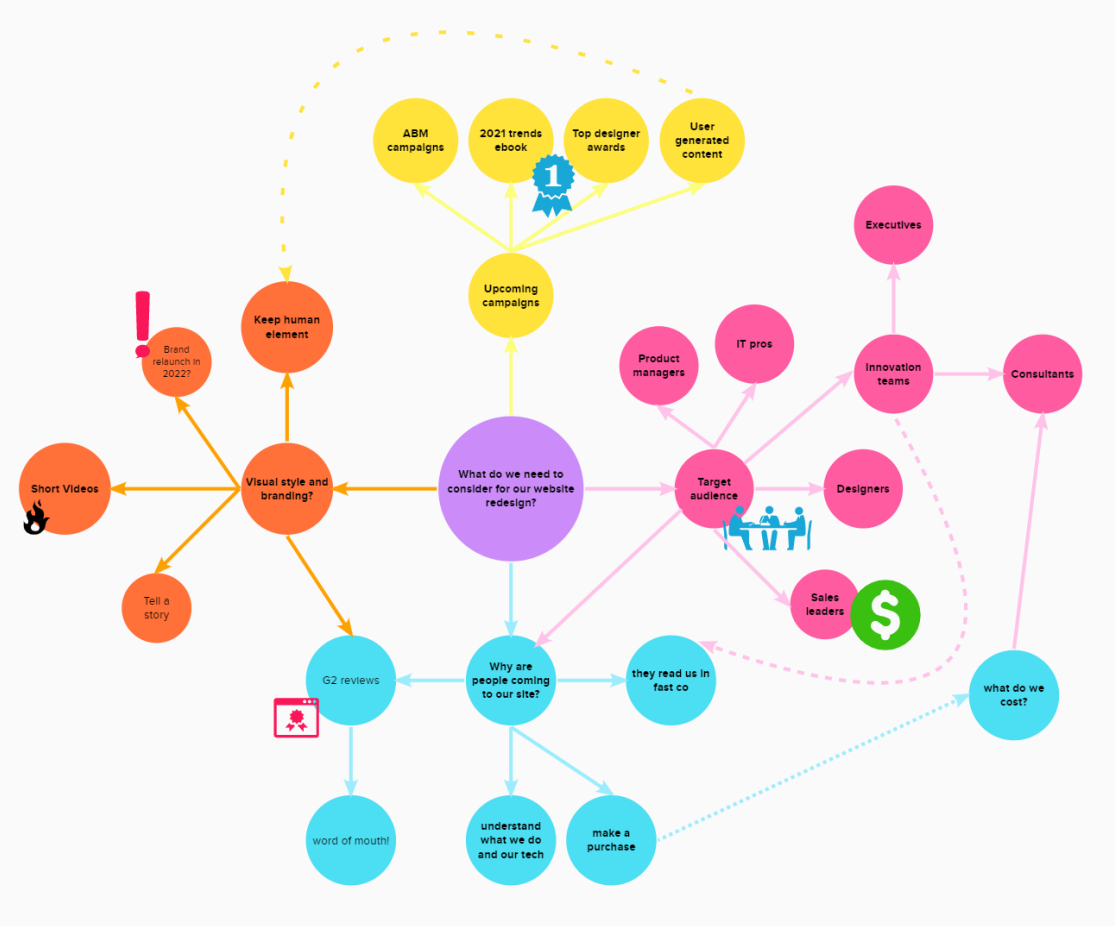

Figure 21 Mural, 2022)

The process of visual brainstorming started with agreeing on which way the ideas and thoughts would be communicated and what platform to use. After discussing the different options of drawing by hand, drawing using an iPad, and different visual brainstorming platforms, the authors found a website called Mural. Mural provides various visual tools to use when being in the design process of something new. The template that was chosen to work with is called Mind Map Brainstorming.

The first step in mind-mapping was to define the problem, this was followed up by noting down all topics that were thought of. After this was done, the chosen topics were then identified and further characteristics were detected. While in the process of mind-mapping a high level of creativity was required to get the most out of the brainstorming. No rules or boundaries were set and whatever came to mind was written down.

3.4.2 Bodystorming

Moving on from the visual brainstorming, the next method used was bodystorming. Bodystorming works as a technique where the users imagine that the product they are working on already exists. It means going through an idea by improvising quick and easy scenarios that will reveal assumptions and problems, and make it easier for the group to continue modelling their new product.

Bodystorming involves nine steps: (Thisisservicedesigndoing, 2022)

1. Start looking at what type of previous knowledge and experiences can be valued bringing into the session.
2. Look at who is going to participate in the session, it should always be the people creating the new tool or design, but sometimes it can also be of value to bring in other participants that know and understand the situation and already have a deep appreciation for the vision, but can also be experts or, for example, the end-user of the potential product.
3. Make sure that everyone has understood the “workshop”, and if not, everyone is familiar with the entire context of it; make a short introduction and provide an example of how it can be done.
4. Where will the bodystorming take place? Sometimes it can be good to perform the session in a space where the potential product will be used. This step is also there to prepare any props or similar necessities that can help the process.
5. The fifth step is about going through the different situations or other scenarios that can be a part of the bodystorming.
6. This is the part where the bodystorming begins;take one situation at a time and try to let it take time while acting it out. Sometimes it can feel uncomfortable to start with, but be open to laughter, and that it is always possible to change the roles so that everyone tries different roles and finds the one they feel fits them the most.
7. One or two persons that are not taking part in acting should take notes to the end and explain to the rest of the group what they have discovered.
8. Repeat this for the different situations that were stated in the beginning.
9. The last step is about reflecting on the journey and seeing what is useful to continue working on.continue working on

Figure 22 (Medium, 2022)

To get familiar and comfortable with the concept of bodystorming, movies were analysed that explained different scenarios of bodystorming. After this, the nine steps of bodystorming were investigated. The first step as explained above is about identifying useful information from previous experiences and recorded knowledge that seems to be relevant for the workshop. While the combined experiences regarding lighting design of the authors are not the most extensive, it did not take a long time to realise with the help of internships and previous jobs, that there is clearly something missing in the industry of lighting design. This first-hand experience and knowledge was of course something that was incorporated into the bodystorming.

To stay on productive, the only people participating in the process of the bodystorming were the two authors of this thesis. A colleague was asked to take notes. The bodystorming was done outdoors in a park in Malmö, Sweden. The time this bodystorming was conducted was on a weekday in the afternoon to avoid big groups of people. The authors chose to be outdoors as the tool is primarily connected to lighting. Lastly, before the authors started the bodystorming, they came up with the different situations they wanted to try. They first agreed on three situations in different scenarios and after doing them, tried one more.

The authors started the bodystorming, going through each situation at a time. Between every situation, the authors talked with the third person taking notes to identify new ways of approaching the next situation. A list with bullet points was created to continue the work of designing the Lighting Design Tool for Recommendations to Different Lighting Cultures.

3.4.3 Product Vision Board

A product vision board is also a tool to develop a new product or design. It is used to organise ideas and thoughts and will provide a vision for the new product/design. The product vision board identifies the intended target group, the solvable problem, what will make the product stand out, the business goals, the competitors, revenue streams, cost factors, and channels; how the marketing will take form.

When using this process, it is good to start approaching each exercise thoroughly and trying to include stakeholders and other team members to get a variety of different perspectives. From this, the process will get the most out of the product vision board. The board does not have to be filled out step by step and in order, it can be filled out here and there, going back to each exercise several times during the process (cityinnovations, 2022).

The product vision board that was used for this paper was:

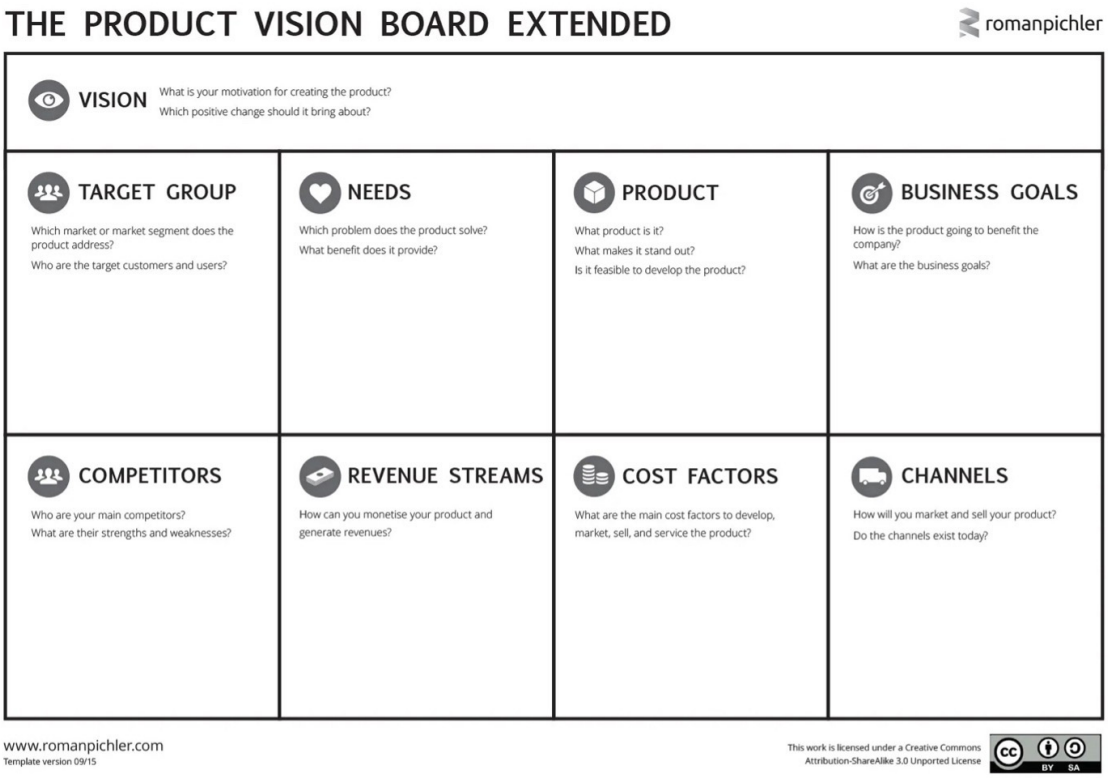

Figure 23 (romanpilcher, 2022)

After investigating multiple possible designs for a product vision board, the one most suitable for the project was one by Roman Pichler. This version is the most used in the design of new possible products.

It was discussed what points should be on the vision board. Ending up with a finished board, a vision for the product could be discussed. This vision then ended up helping with the continuance of the design for the Lighting Design Tool for Recommendations to Different Lighting Cultures

3.5 Vision

“Imagine if different cultural preferences for lighting could be identified and presented, to increase knowledge and understanding of how to include them in the the various preferences in lighting design.”

3.6 Problem Statement

“How can research from a literature review combined with a survey define different cultural preferences to lighting that can be considered in the creation of new lighting design?”

CHAPTER 4

4.0 Analysis

4.1 Survey

While information was gathered from the literature review, a survey was also part of the plan to collect data. A survey was chosen to collect answers from people from around the world.

When starting the process of creating the survey, it was essential to get the most unbiased feedback possible. To ensure this, the questions designed for the survey should not be leading or influence the participant's opinion. At the beginning of the survey, we described the aim and purpose of the survey and the participants were asked to think about a specific square in their respective cities. The reason the participants should think about a square that they are familiar with is so that it could be ensured that the answers they provide are as accurate as possible. The first three questions asked the participants where they were born, grew up and live today. Next, the participants answered what their age and gender are. This was followed up with a picture showing CCT from low to high for the participants to familiarise themselves with CCT. The number of questions regarding light in the survey is seventeen. The first three questions asked the participant about CCT, and they could answer these questions with either warm(low CCT), neutral(medium CCT), or cold(high CCT).

The three questions were as follows:

1. When I am in the public square in my city at night, the light feels
2. If the light could be different at night, what would you like it to be?
3. When in the square in the daytime, around noon, the light there feels

The remaining fourteen questions could be answered on a scale from one to seven, where one is disagreement and 7 is agreement.

The fourteen questions were as follows:

1. With the current lighting design in the square, it is hard to see the surroundings.
2. I feel that the square is too dark at night
3. I feel that the square is too bright at night
4. I feel the contrast between lit up and dark areas in the square is too strong
5. The lighting in the square at night usually lights up trees, bushes, and buildings
6. The lighting in the square at night usually lights up the ground I am walking on
7. It is easy to recognise faces in the square at night
8. It is easy to find my way in the square at night
9. The lighting in the square at night gives me a safe feeling
10. I feel the lighting in the square only serves the purpose of being useful; it does not look good
11. The lighting in the square helps to create an atmosphere
12. I feel that the public lighting design in the square is comfortable (I don't mind spending time here)
13. I feel that the lighting in the square fits into the overall atmosphere of the city
14. I feel the public lighting I live with today is very different from where I grew up.

4.2 Results

4.2.1 Results from Question 1

Where the participants were born, grew up and currently live:

After the survey was closed to the public, the results could be examined. There were 44 participants from eleven different countries that answered the survey. (Figure 30) The participants were asked where they were born, grew up, and currently live. Out of the 44 participants, 11 were born in Sweden, five were born in Germany, one was born in Iran, one was born in Crimea, one was born in Mexico, two were born in the United States of America, and five were born in Denmark, three were born in Italy, one was born in Kazakhstan, one was born in Portugal, two were born in Poland, one was born in Bulgaria, one was born in Ukraine, two were born in Australia, one was born in Slovakia, one was born in Romania, and the last person was born in the UK.

Country	Born	Current	Grew up
Sweden	15	13	15
Germany	5	4	7
Iran	1		1
Crimea	1		
Mexico	1	1	1
USA	2	2	2
Denmark	5	14	4
Italy	3	2	4
Kazakhstan	1	1	1
Portugal	1		1
Poland	2		1
Bulgaria	1	1	1
Ukraine	1		
Australia	2	2	3
Slovakia	1		1
Romania	1		1
UK	1	1	1
Lithuania		1	

Figure 24. Own production

Compared to where people were born, the numbers for where people grew up are different. 15 out of the 44 participants grew up in Sweden; seven grew up in Germany. one grew up in Iran, and one grew up in Mexico. Two grew up in the United States of America, four grew up in Denmark, four grew up in Italy, one grew up in Kazakhstan, one grew up in Portugal, one grew up in Poland, one grew up in Bulgaria, and three grew up in Australia, one grew up in Slovakia, one grew up in Romania, and one participant grew up in the UK.

The distribution of where the participants live today also differentiates from the former two. 13 out of the 44 participants currently live in Sweden; four live in Germany, one lives in Mexico, two live in the United States of America, 14 live in Denmark, two live in Italy, one life in Kazakhstan, one life in Bulgaria, two live in Australia, one life in the UK and one participant lives in Lithuania.

4.2.2 Results from Question 2

The gender of the participants:

Next, the participants answered questions regarding age and gender. Ages range from 18 to 62, and most of the participants, 65,9 %, were female. The remaining 34,1 % were male.

4.2.3 Results from Question 3

All 44 participants responded to this question.
-40,9 % reported that the light in the public square has a medium CCT.
-47,7% of the participants answered that the light has a low CCT.
-11,4 %, said that the light they have today in the square has a high CCT.

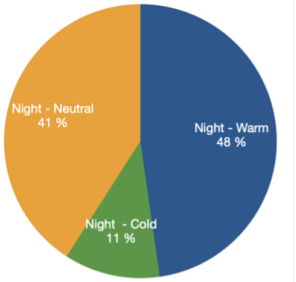

Figure 25. Own production

4.2.4 Results from Question 4

Wishful CCT in a public square at night that the participants are familiar with:
Only 41 out of the 44 participants answered this question.

-66 % of the participants said they would prefer to have a low CCT.
-27 % responded that they would like to have a medium CCT.
-7 %, said that they would prefer a high CCT.

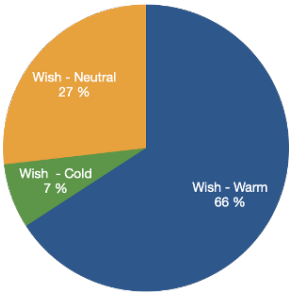

Figure 26. Own production

4.2.5 Results from Question 5

This and all following questions were answered with the help of scale from strongly disagree (1) to strongly agree (7).

Visibility in a public square at night that the participants are familiar with:

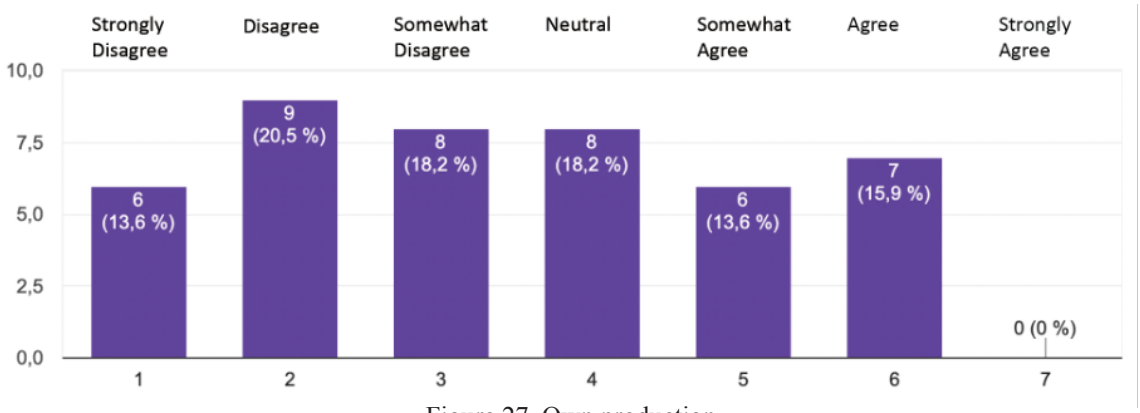

Figure 27. Own production

4.2.6 Results from Question 6

Experienced darkness in a public square at night that the participants are familiar with: Every participant responded to the question.

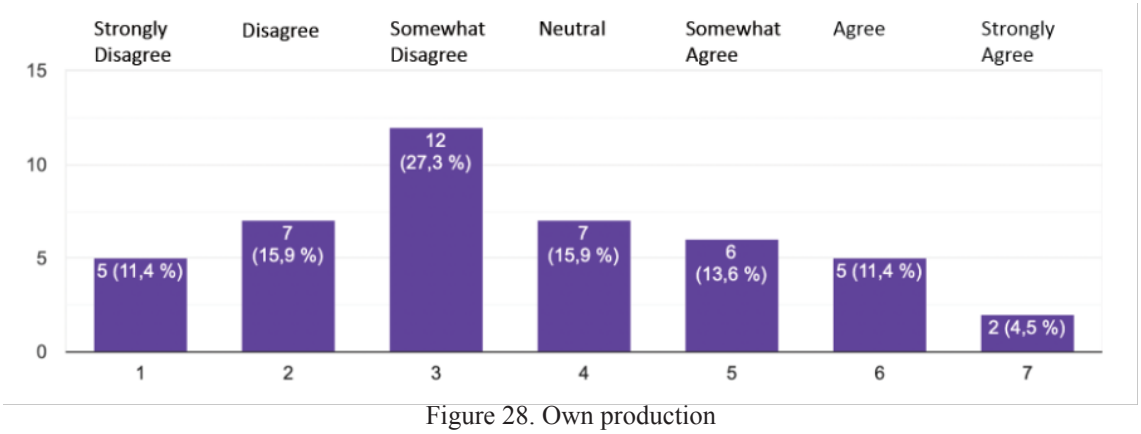

Figure 28. Own production

4.2.7 Results from Question 7

Experienced brightness in a public square at night that the participants are familiar with: Every participant responded to the question.

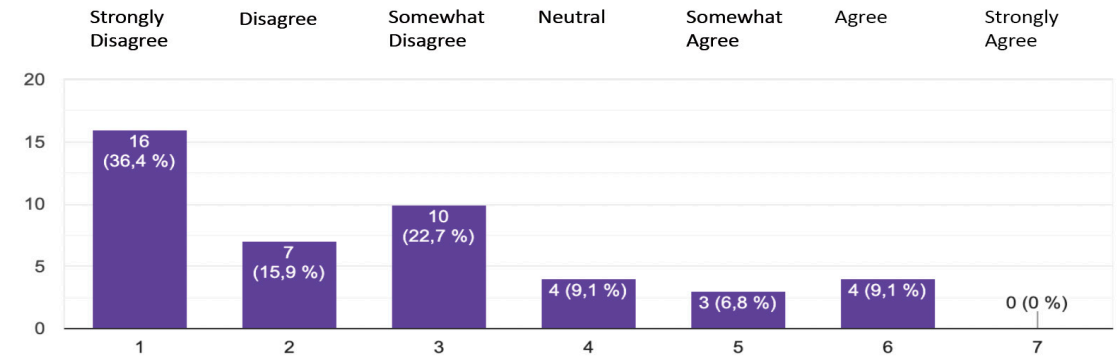

Figure 29. Own production

4.2.8 Results from Question 8

Experienced contrast in a public square at night that the participants are familiar:
Every participant responded to the question.

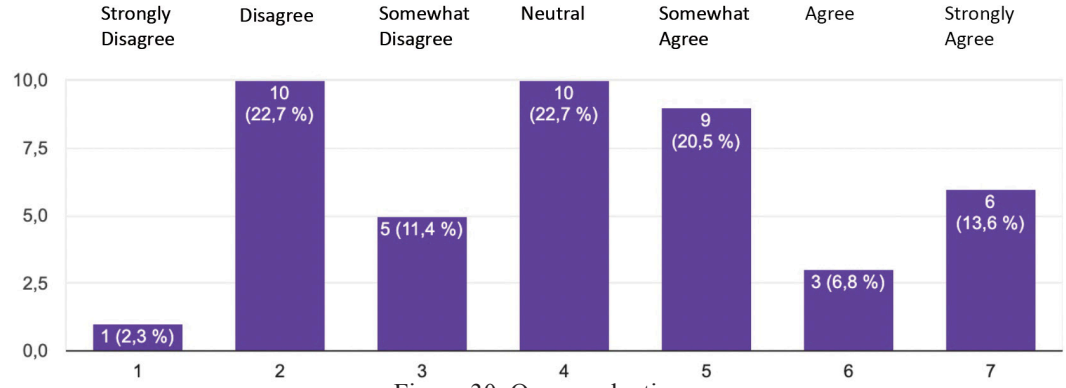

Figure 30. Own production

4.2.9 Results from Question 9

Trees, bushes, and buildings being illuminated in a public square at night that the participants are familiar with.
Every participant responded to the question.

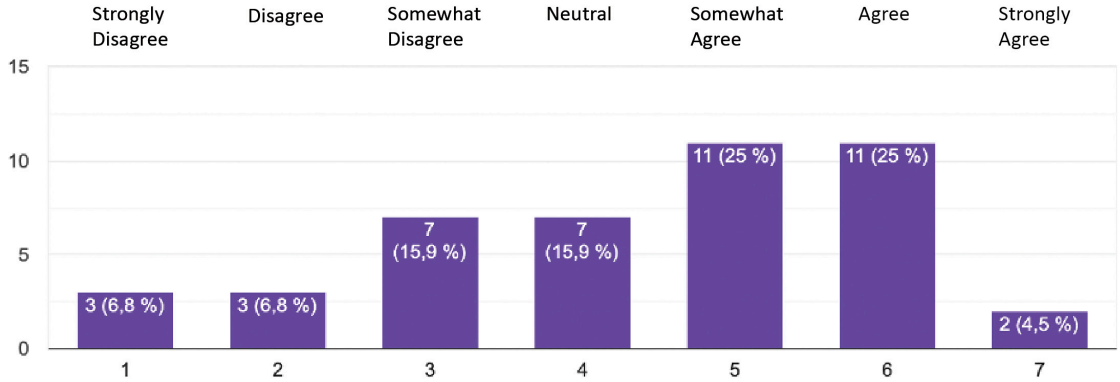

Figure 31. Own production

4.2.10 Results from Question 10

The ground the participants are walking on in a public square at night that the participants are familiar with is illuminated.
Every participant responded to the question.

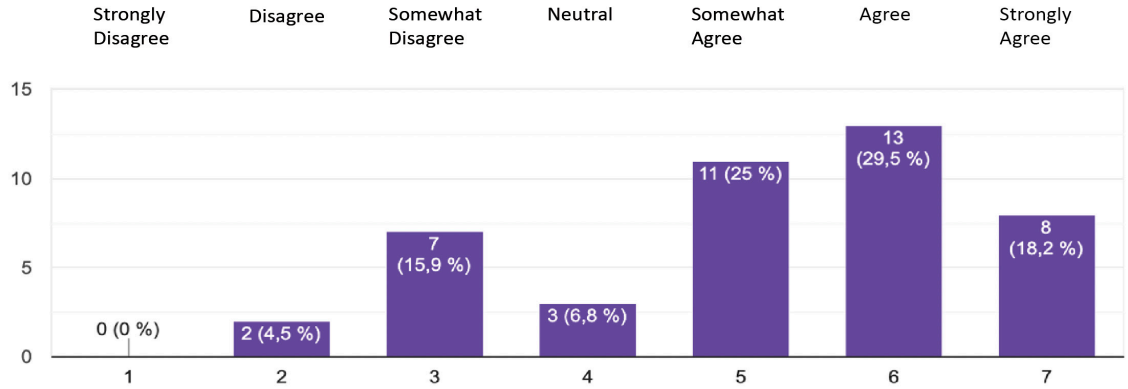

Figure 32. Own production

4.2.11 Results from Question 11

Face recognition in a public square at night that the participants are familiar with. Every participant responded to the question.

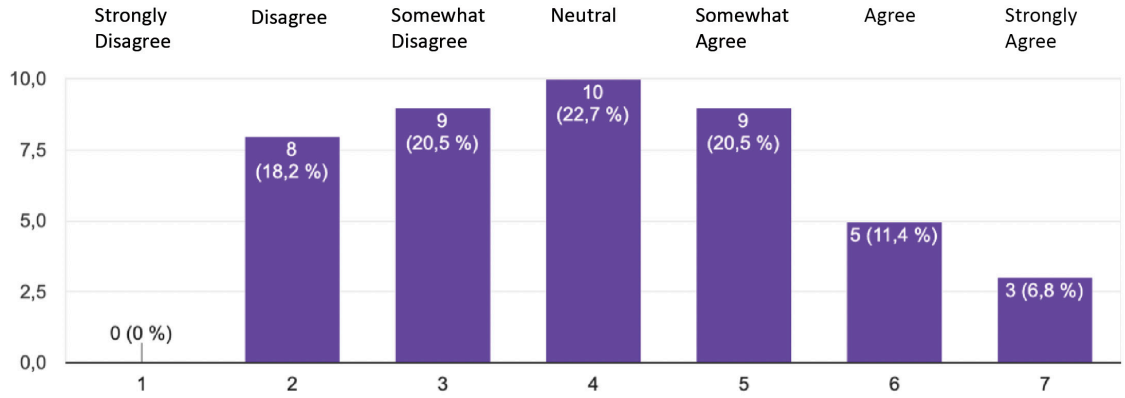

Figure 33. Own production

4.2.12 Results from Question 12

Navigating in a public square at night that the participants are familiar with. Every participant responded to the question.

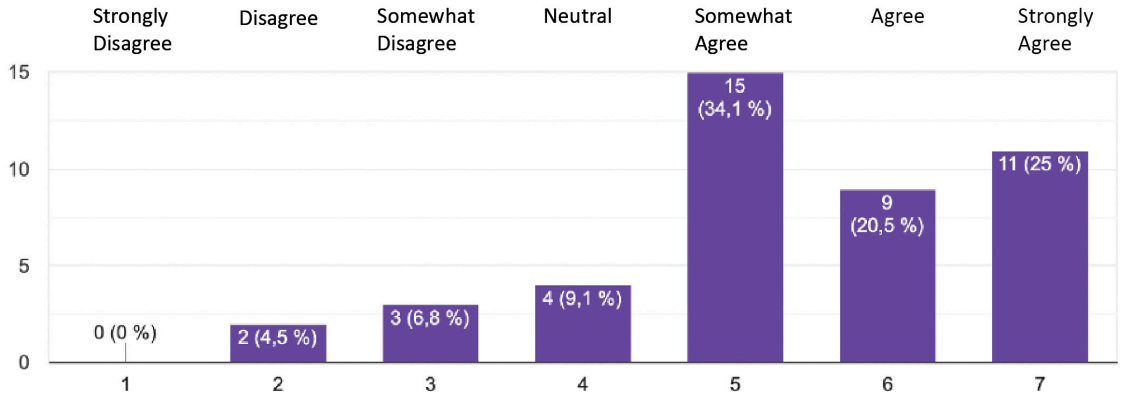

Figure 34. Own production

4.2.13 Results from Question 13

The feeling of safety in a public square at night that the participants are familiar with: Every participant responded to the question.

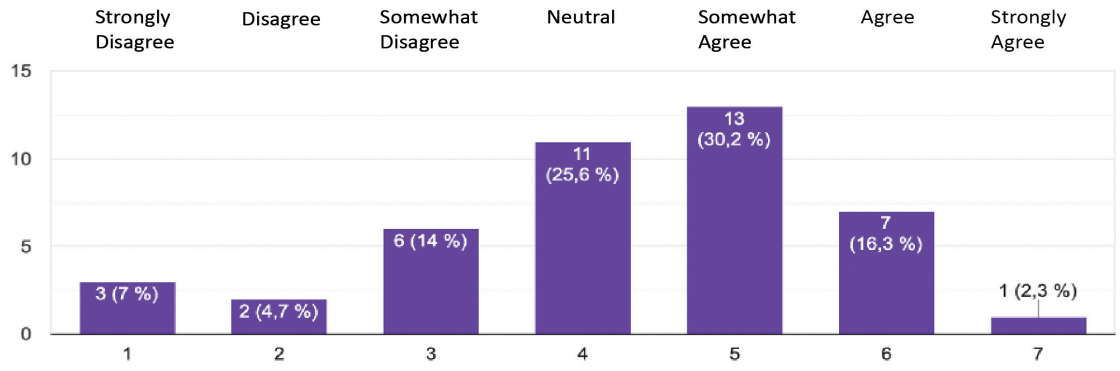

Figure 35. Own production

4.2.14 Results from Question 14

The purpose the participants experienced the lighting design of a public square at night that the participants are familiar with:
Every participant responded to the question.

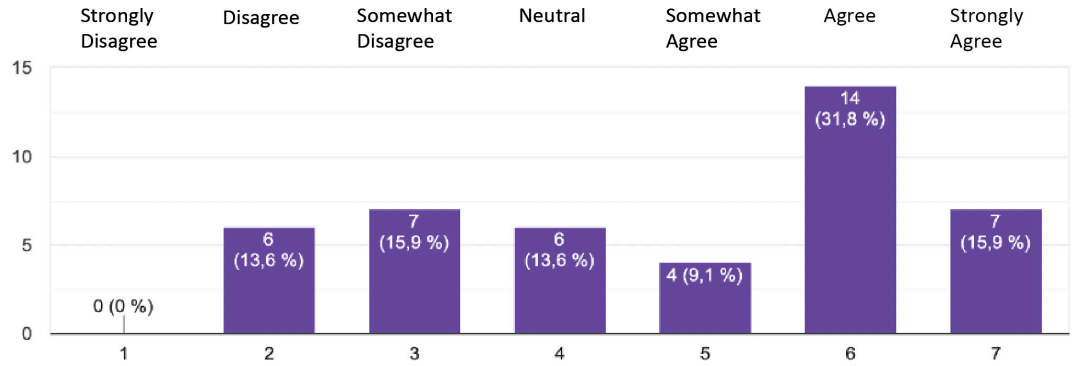

Figure 36. Own production

4.2.15 Results from Question 15

The experienced atmosphere in a public square at night the participants are familiar with:
Every participant responded to the question.

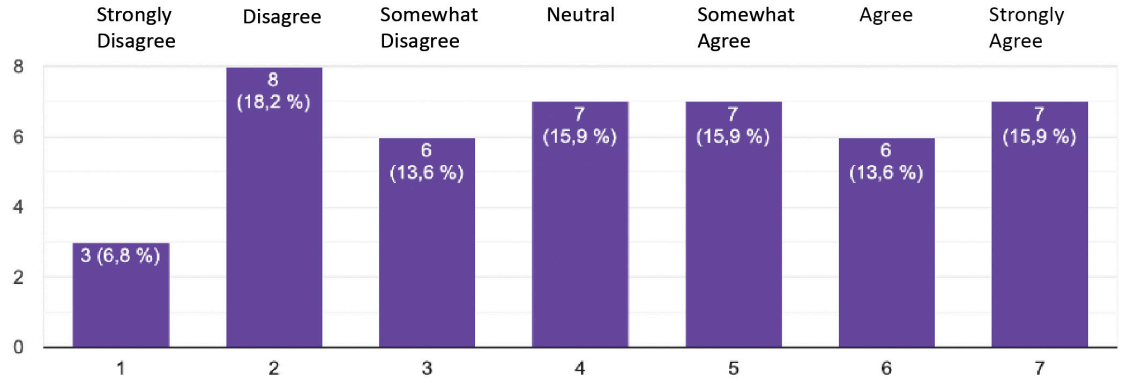

Figure 37. Own production

4.2.16 Results from Question 16

The feeling of comfort in a public square at night that the participants are familiar with:
Every participant responded to the question.

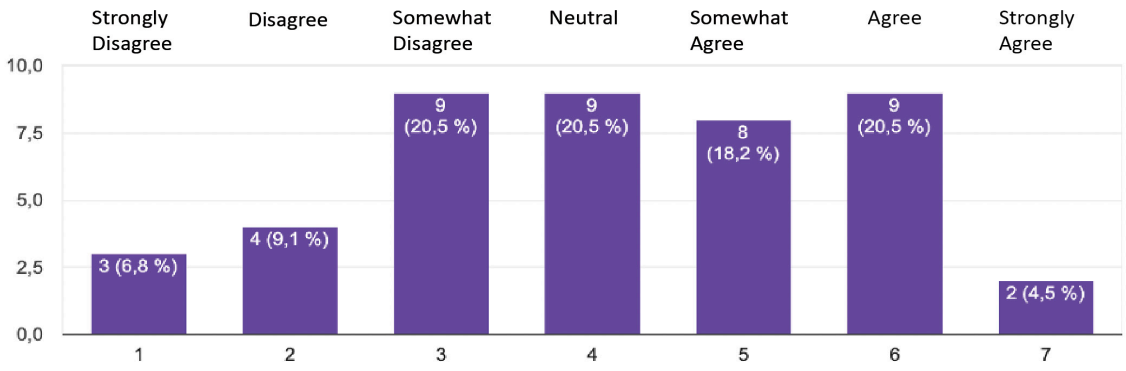

Figure 38. Own production

4.2.17 Results from Question 17

The experienced atmosphere in a public square at night that the participants are familiar with matches the overall atmosphere of that specific city:
Every participant responded to the question.

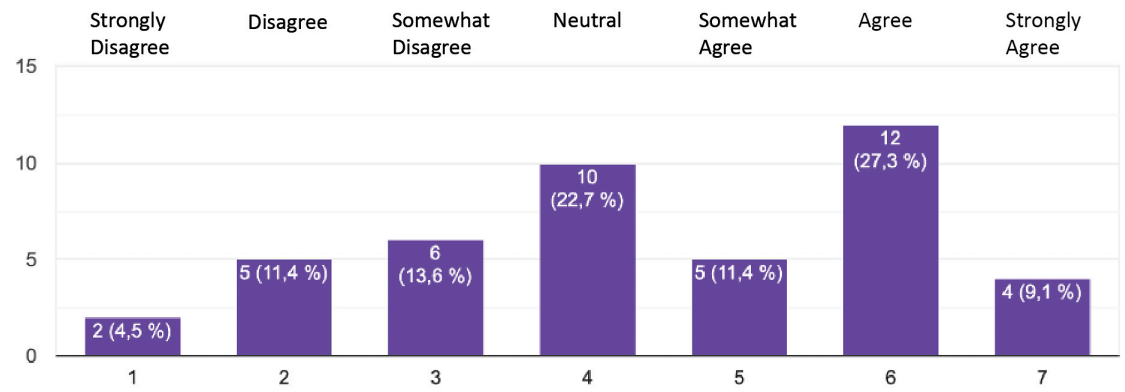

Figure 39. Own production

4.2.12 Results from Question 18

Comparing the lighting design in a public square at night that the participants are familiar with if it is different to the lighting design in a public square at night that the participants grew up in:
43 out of 44 participant responded to the question.

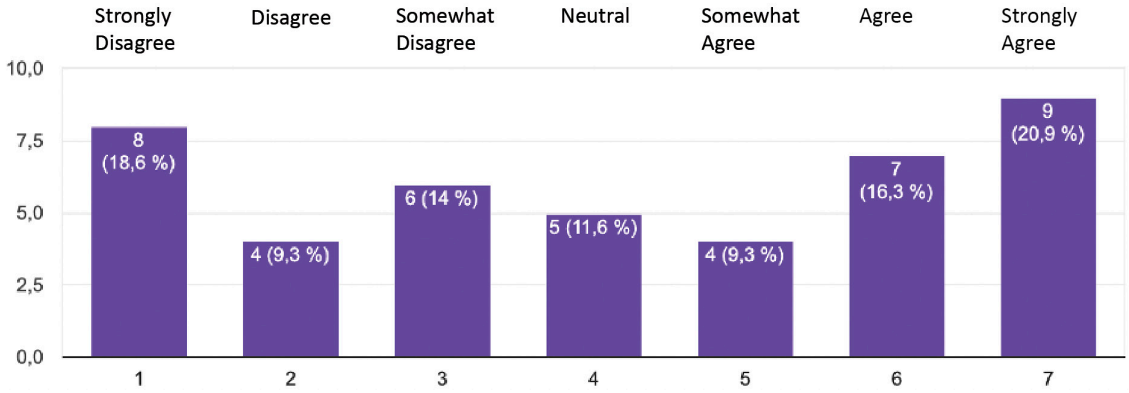

Figure 40. Own production

4.3 Method for survey analysis

Analysing survey data can be done in multiple different ways. According to datapine.com, there are 10 essential methods of analysing data from a survey.("What Is Data Analysis?," 2022). The method that fit the survey the best was the one called exploratory analysis. This method is applied after the survey is completed and the collected data is investigated. This investigation entailed the comparison of similarities and differences of different cultural preferences toward lighting in a public space. The method helped to find connections between the answers so that a hypothesis could be generated which assisted in the analysis and report of personal cultural preferences towards the lighting the participants of the survey live with.

4.4 Result Analysis

While specific survey results like age and gender are relatively self-explanatory, in this section, the results of the remaining questions will be the focus. To better understand the differences and similarities, all countries were divided into three categories. Category one holds the countries Sweden, Germany, Lithuania, Denmark, and the UK. These categories are marked orange; see figure 47. Category one could be described as countries from northern Europe. Category two consists of the United States of America and Kazakhstan. These countries are marked green, see figure 47. Lastly, category three comprises Bulgaria, Australia, Italy, and Mexico. These countries are represented by blue in figure 47. The red countries marked on see figure 47 are countries that have not been asked regarding their lighting.

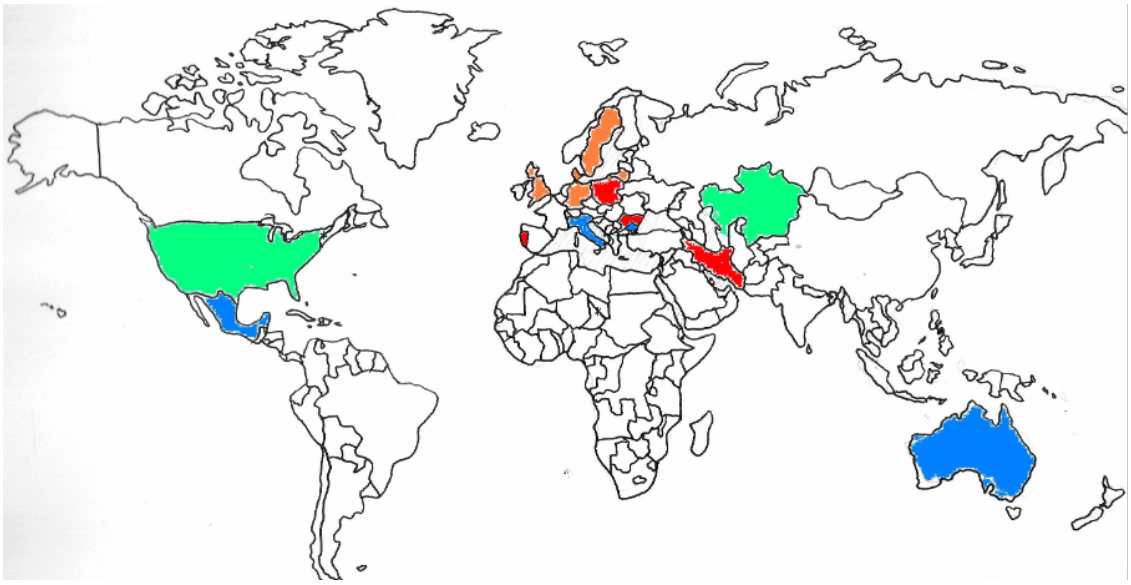

Figure 41. Own production

Looking at all questions asked, the answers given by the participants from category one will always reflect a similar outcome to the overall responses from all participants. This is due to the number of people in category one. The number of participants from category one is thirty-five, the number of participants from category two is three, and the number of participants from category three is six.

After the participants answered the questions regarding the countries they were born in, grew up in and live in today, they were asked about gender and age. The first question asked regarding light, asked the participants what CCT the light in a public square in their city has. While the distribution of low CCT with 47,7 % and the neutral CCT with 40,9 % are relatively equal only 11,4 % of participants answered that they have cold lighting in their square today. All these participants are from category one, and the counties they are from and live in are Germany, Denmark, and Sweden, respectively. All these participants also answered that they would prefer warm light over the cold light that they currently have.

When looking at the remaining answers to the question regarding what CCT they would wish for, the majority, with 65,9 %, answered that they would prefer a low CCT for their square. 26,8 % of the participants said they would wish for a medium CCT. The remaining 7,3 % wished for a high CCT; all these participants also answered that they are located and live in northern Europe.

All questions in the survey were answered with the help of a scale from one to seven. One being disagreeing a lot and seven agreeing on a lot.

When analysing the first question, With the current lighting design in the square, it is hard to see the surroundings? Instead of looking at who disagreed with the answer, assuming the lighting in their current situation is the way they want it to be, the data was analysed from the participants agreeing with the statement. 34% of the participants agreed with the statement, 85% from category one, and 15% from category three. This data shows that most participants that feel that it is hard to see the surroundings with the current light they experience come from northern Europe. This also matches with the answers given to question two.

In question two, the participants were asked if they feel that their square is too dark at night. 29% of all participants agreed with this statement. 83% of the answers came from category one and 17% from category three.

Question three asked the participants if they felt the light in the square was too bright at night. Only 14% of participants agreed with this statement. 83% of those who agreed came from category one and 17% out of category two—leaving category three where a 100% disagreed with this statement. This left us with the result that only a minority of the participants believe it’s too bright at night.

The fourth question asked the participants if they felt that the contrast between lit up and dark areas in the square was too strong. Here the minority disagreed with the statement. Every participant who disagreed either belongs to category one or three. While in category one, the disagreement has 40%, equal to that of agreement. In category three, the disagreement lies at 33% while the percentage of agreement lies at 55%.

Question number five asked the participants if the lighting usually lights up trees, bushes, and buildings. When looking at the data for the answers to this question, while the disagreement for the answer overall is 34%, 92% of these answers came from category one and 8% out of category three.

When asked if it is easy to recognise faces in question seven, 44% of the participants disagreed, 39% agreed, and 17% stayed neutral. When analysing the categories for itself this question, 94% per cent of all the answers came from category one and 6% from category three.

Question eight asked the participants if they felt it was easy to find their way at night in the square. This question had the smallest percentage of disagreement out of all questions. Only 14% disagreed, while 74% agreed, and 11% stayed neutral. 100% of these answers come out of category one.

The ninth question asked regarded the feeling of safety in relation to the square at night. It is worth mentioning that the countries from category three, belonging to more southern regions depict almost the opposite of the participants from northern Europe. While 53% from northern Europe agree with the statement about safety, 21% disagree. In category three, 50% of the participants disagree with this statement, while 33% agrees. Countries from category two, USA, and Kazakhstan, did not have a majority in answers; they were evenly spread out. This leads to the overall conclusion that 53% of all participants feel safe at night in the square, 21% do not feel safe, and 26% stay neutral on the matter.

Question ten asked the participants if they felt the lighting in the square only serves to be useful. When looking at the question answers, most answers agree with this statement. However, it must be mentioned that only the majority in group 1 agrees with this statement. Category two disagrees with this statement with 67% and only agrees with 34%. Participants from category three do not swing one or the other way; their answers are evenly spread out.

The next question in the survey asked participants if they feel that the light in the square of their city creates an atmosphere. Most of all, answers disagreed with this statement. This also counts for the countries in category one. However, it does not match with the answers from the other two categories. Participants in category two agree with 67% and disagree with 33%. In category three, 43% agreed with the statement, and in category three, 43% agreed, and 57% stayed neutral.

The twelfth question participants answered asked them if they felt the lighting in the square was comfortable. Out of all answers, 43% of answers agreed with the statement, 17% stayed neutral, and 40% disagreed with the statement. Looking at categories one and three, most answers here agreed with the statement; in category two, however, 67% stayed neutral, and 34% disagreed with the statement. When looking at the results in category one for questions eleven and twelve, they almost have the same percentages regarding the agreement, disagreement and having a neutral stand.

The second to last question asked the participants if they feel that the lighting design of the square they described until now fits into the overall atmosphere of the city they live in. Twenty-nine per cent of all participants disagreed with this. Looking at all the categories individually, the results from each category show the same or similar results. Category one disagrees with 29%, category two disagrees with 33%, and category three disagrees with 33%. Regarding the agreement to this statement, 47% in category one agreed, and 24% stayed neutral. In category two, the answers were evenly spread out, and in category three, 67% agreed, and 0% were neutral.

The last question in the survey asked the participants if they feel that the lighting, they experience today is very different from where they grew up. 98% of participants answered this question. The majority agreed that the lighting is different. However, it must be mentioned that only eleven out of all participants grew up in a foreign country from where they live today. While previous questions did not ask about any specifics regarding the lighting culture the participants grew up in, the last question in the questionnaire regarded just this.

Regarding category one, 54% agreed, 41% disagreed, and 6% stayed neutral. In category two, the results were equally distributed. In the third category, 51% disagreed, 33% stayed neutral, and 17% agreed. Out of the eleven participants who grew up in a country different from where they live today, ten of them agreed with the statement, making it 91% and one person did not equal 9%. Four out of these eleven participants answered that they lived in a country not previously mentioned; these countries are Poland, Romania, Portugal, and Iran. Not having asked about the lighting culture participants grew up in leads to a lack of personal input from the participants. This inadequacy of personal information is supported through literature.

4.4 Conclusion

After analysing the data of the survey, the countries were divided into three categories. This was done to get a better understanding of the overall answers.
At the beginning of the paper, the regions of interest regarding lighting were mentioned, Northern Europe, East Asia, and The Middle East. The countries mentioned in the survey were then placed into the region they fit the best. None of the participants lives in the middle east, hence is no information from the participants about that.

Northern Europe:
1. Sweden
2. Denmark
3. Germany
4. Lithuania
5. United Kingdom

East Asia:
1. Kazakhstan

Middle East: None

Looking at all answers, most participants from Northern Europe want warm lighting, have warm or neutral lighting today and only the minority want cold lighting. Looking at East Asia, the light there today is warm and that is also what people would wish for. Due to a lack of information from The Middle East, there are no answers. When asked if the square was too dark at night most people from Northern Europe disagreed with the statement same as most people from East Asia. This also correlates directly with what people had to say about if they feel it is too bright in the square at night. Most people from Northern Europe and East Asia disagreed with this statement. When asked if people think that the light sufficiently lights up their path at night, only a minority of people from Northern Europe disagreed and everybody from East Asia agreed with the statement. When asked if it's easy to recognise faces at night in the square no region had the answers swing one way or another. When asked about the feeling of safety in the square at night, more than half the participants from Northern Europe agreed with the statement while answers from East Asia were equally spread out.
Asked about the lighting in the square and if its only purpose is to be useful, most people from Northern Europe agreed with the statement while most people from East Asia disagree with the statement. When looking at what the participants had to say about the atmosphere in the square, participants from northern Europe mostly disagreed with this statement while most participants from East Asia agreed with the statement. From atmosphere to comfort, participants were asked if they feel the lighting design in the square helps to create comfort. Answers from Northern Europe showed that the most neither agree nor disagree. Answers from East Asia however show that most are neutral or disagree with the statement. No group agrees with another. When asked if the lighting of the square wits in the overall atmosphere of the city most people from Northern Europe agreed with the statement while answers from East Asia were equally distributed. Lastly, participants were asked if they believe the lighting, they grew up with is a lot different from where they live today. Most participants from Northern Europe agreed with this statement while answers from East Asia were equally separated.

The survey showed that the information gathered did not represent the whole population of the world. This is also the reason why the survey needs to be supplemented with a literature review. The survey serves as a small data input that can be compared to the findings in the literature review.

CHAPTER 5

5.0 Litterature Review

The 8 chosen papers:

1. Northern and Southern Lighting Cultures in Europe. Lighting Scenarios for the Indoor Living Spaces
2. Culture, Light and Latitudes: A comparative study of lighting conditions and habits in Brasilia, Berlin, and Copenhagen.
3. Cultural Differences in Allocation of Attention in Visual Information Processing
4. Innovative Design and Creation of Chinese Lighting Culture
5. Place and Space - Architectural Daylight Design in Traditional Housing in Northern and Southern Regions of Europe
6. The luminosity of protection. In: Negotiating protection. Beduin material culture and heritage in Jordan.
7. Homely Atmospheres and Lighting Technologies in Denmark: Living with Light
8. Lighting and Spatial Structure in religious Architecture: A comparative study of Byzantine church and an early Ottoman Mosque in the city of Thessaloniki
9. Mapping Danish Lighting Trends

The first step in reviewing the literature was to read the abstract of each paper to figure out the aim, how the research was conducted and how the conclusion was formed.

After understanding the main concept for each literature review it was time to identify the different themes, debates, and gaps in the papers. All ten sources were categorised into three different sections:

1. Papers connecting regions directly to cultural lighting preferences
2. Papers connecting regions directly to physical factors can explain different cultural lighting preferences
3. Papers connecting architecture to cultural lighting preferences

Category 1	Category 2	Category 3
Northern and Southern Lighting Cultures in Europe. Lighting Scenarios for the Indoor Living Spaces	Cultural Differences in Allocation of Attention in Visual Information Processing	Place and Space - Architectural Daylight Design in Traditional Housing in Northern and Southern Regions of Europe
Culture, Light and Latitudes: A comparative study of lighting conditions and habits in Brasília, Berlin and Copenhagen		
Innovative Design and Creation of Chinese Lighting Culture		
Homely Atmospheres and Lighting Technologies in Denmark: Living with Light		
LIGHTING AND SPATIAL STRUCTURE IN RELIGIOUS ARCHITECTURE: a comparative study of a Byzantine church and an early Ottoman Mosque in the city of Thessaloniki		
Mapping Danish Lighting Trends		

Figure 42. Own production

From these three categories each paper was analysed and discussed in the aim to define cultural lighting preferences from different areas around the world providing an apprehension how culture influences lighting preferences. Apart from that architecture which plays a major role was also discussed.

5.1 Paper 1

A summary of the first paper and it's abstract:

The first paper is called *Northern and Southern Lighting Cultures in Europe, Lighting Scenarios for the Indoor Living Spaces*. This paper is written by two authors from the MSc Lighting Design at Aalborg University in Copenhagen, Denmark. The aim of the paper is to provide knowledge about different preferences for lighting in private indoor spaces, like an apartment, for example. The research of the paper is built on investigations through academic papers, a book with interviews with 49 lighting designers around the world and then an online survey which the authors constructed by themselves. The survey involved participants from Denmark and Lithuania (North) and then Greece and Italy (South). The authors started looking at general knowledge about lighting cultures but soon after that narrowed it down to looking at lighting preferences of the end-user, the people buying fixtures for their home. More specific they were looking at the way the end-user is socialising in their own living room and kitchen, eating dinner – both spaces involved hosting guests. Upon investigation of the matter, an on-site test took place in an actual apartment with the participants of the survey, providing input from Northern and Southern Europe. The results from the research proved that lighting preferences in Europe are divided, the results show that there are two lighting cultures in Europe. The results of these tests yielded enough information to create a process for manufacturers and end-user being beneficial for both parts. The process describes various lighting scenarios which would create awareness about the qualities of light.

Analysis of the first paper:

The paper *Northern and Southern Lighting Cultures in Europe, Lighting Scenarios for the Indoor Living Spaces* is comparing northern lighting preferences and southern lighting preferences. The Nordic lighting is defined as minimalistic and often very influenced by the qualities of the sunshine, and its longer dusk and dawn periods. The people living with Nordic lighting tend to design their homes with lower colour temperatures. Because the northern countries usually have shorter daylight hours than a lot of other countries around the world the obsession over daylight and especially sunlight as that is even more uncommon, is quite massive. Therefore, Dynamic Lighting has become a big topic in this region, for example. Dynamic Lighting is a changing lighting design where the lighting is often programmed based on the daylight. With Dynamic Lighting, it is possible to create different scenarios. So, this is where the importance of electric lighting comes in. In Nordic countries, it is necessary to work with both daylight and electric lighting as there is no chance to utilise only one. This is how working with different light zones in spaces came alive—considering daylight combined with electric lighting.

The southern lighting is then something completely different to northern lighting as the natural light in this region comes mainly from the sun. The southern lighting can sometimes be categorised as very bright, as the main source of light is the sun, while also bringing glare, brilliant colours, and sharp shadows. Another thing to consider when comparing these two regions is the position of the sun over the year, daylight hours in the day and the amount of time dusk and dawn take, changing how electric lighting is used in the different regions.

What can be taken from this is that people living in a southern climate spend most of the time outdoors in the daylight and sunlight. Because the transition between day and night happens so fast, the combination of daylight and electric lighting rarely occurs. The main source of light during the darker hours of the day are mostly fixtures integrated into the ceiling, and more uncommonly, pendants.

This light is often very intense but because it is integrated most of the time, it is not very glary. The southern countries do not tend to use warm colours for their lighting, this is a huge contrast to northern countries where there are almost only warm lighting colours for the electric lighting indoors. The experiences and appreciation of warm colours, dark spots, and soft shadows are not common in the southern countries.

From the experiments in this paper, the findings were that light sources in northern countries are mostly in the range from warm to neutral, and in southern countries, they are mostly from neutral to cold. In northern countries, it is also common to use pendants and table lamps but in southern Europe, it is usually recessed or mounted fixtures in the ceilings. As mentioned before there are also more layers of light and dark in the northern countries whereas in the southern part of the world one light source lighting up the entire space is more frequently used.

5.2 Paper 2

A summary of the second paper and it's abstract:

The second paper is called *Culture, Light and Latitudes: A comparative study of lighting conditions and habits in Brasilia, Berlin, and Copenhagen.* The author is a student of MSc Lighting Design at Aalborg University in Copenhagen. The research is looking at natural light conditions and electrical lighting habits in the cultures of Brasilia, Berlin, and Copenhagen. Focusing on comparing the natural light conditions and artificial lighting habits and how the people in these three cities perceive light. This is done by an analytical discussion that is based on theories about the physiology of the visual system, concepts of phenomenology, daylight analysis and climate studies. This study is also looking at indoor spaces, comparing living rooms in a case study to state the lighting habits. To establish the lighting habits of the cultures for the natural light of these latitudes a discussion was made based on "established equivalencies between natural light and artificial lighting settings".

Analysis of the second paper:

In the analysis section of this paper, there is also a discussion going into the specifics of northern and southern lighting preferences. Countries near the equator tend to have more intense lighting and are a lot of the time placed in the ceiling. The paper also describes that the Nordic lighting reflects on lower light levels with a more sensitive touch together with a warm colour temperature. These statements follow the natural light for the different regions.

From the result of the study in this paper, the author explains that a pendant fixture is not common use in Brasília, the results also showed that the use of table lamps is neither. In Brasília, the main light source is usually installed in the middle of the room. This is very different in Copenhagen, as the main source of light is usually not placed in the middle of the room. Another thing that directly differs from Brasília to Copenhagen is that pendants are very frequently used in the homes of Copenhagen, this is done with a much lower height of the pendant compared to the pendants that are rare to find in the homes in Brasília. As aforementioned, the use of one main light source in the middle of the room in Copenhagen is rare. The results of the paper show, however, that there is usually no main source of light. The homes are designed with a lot of smaller light sources. This way of designing the light also contributes to lighting layers which gives a space more contrasts. The results also showed that in comparison, candleholders are very popular in Copenhagen.

Besides Brasília and Copenhagen, Berlin was also analysed. Like Brasília, the main source of light was placed in the middle of the room, although something that does not match Brasília or Copenhagen is that the main light sources in Berlin were often pendants and these pendants were often not placed over tables.

5.3 Paper 3

A summary of the third paper and it's abstract:
The third paper is called *Cultural differences in Allocation of Attention in Visual Information Processing*. The authors are from Boğaziçi University, Istanbul and the University of Michigan, Ann Arbor. The research from this paper is comparing two different cultures, Westerners and East Asia. This paper is researching if there is a difference in allocation of attention in visual information processing. This is done by two experiments using a visual change detection paradigm. The results show that "East Asians are better than Americans at detecting colour change when a layout of a set of coloured blocks is expanded to cover a wider region and worse when it is shrunk". The results also show that "East Asians are slower than Americans are at detecting changes in the centre of the screen".

Analysis of the third paper:

This paper explains how cross-cultural investigations of cognitive differences between East Asians and Westerners differ in cognitive styles. The paper proves that East Asians "tend to be more holistic" and Westerners "tend to be more analytic". To get the best understanding of the discussion of the findings for this paper, here is a quote from the discussion:

It could be argued that the differences that we have attributed to cultural differences in attentional focus may be partly explained by strategic, top-down differences in task goal processing across the two culture groups. The experimental task used in this research consisted of two different types of trials: visual change detection and focal detection. Because there were fewer focal detection trials compared to visual change detection trials, the visual change detection trials may have been given greater importance. If such a bias was more prominent among our East Asian sample compared to our American sample, then our results regarding the East Asian's slowing down in the focal detection trials could have been attributed to top-down differences in goal processing.

" We argue, therefore that the data from both the change detection and focal detection trials suggest that there are attentional focus differences in East Asians and Westerners"

5.4 Paper 4

A summary of the fourth paper and it´s abstract:

The fifth paper is called Innovative Design and Creation of Chinese Lighting Culture. The author Qian Zhao was writing the paper from Suan Sunandha Rajabhat University. The paper explains the development of the Chinese social economy and the people's spiritual needs and how it's increasing. Looking at different lamps in the Chinese lighting design industry. The paper is walking the reader through the innovative design and creation of Chinese lighting culture.

Analysis of the fourth paper:

This paper explains how the design of fixtures in Asia is often based on religious beliefs, and how that affects the culture of the lighting design. The Chinese lighting culture is combined with the aesthetics, ideas, and emotions that lighting brings. China´s history is very rich and has therefore influenced the culture of lighting, this is often seen through colours. Asians often refer to the "five colours" which are cyan, yellow, red, white, and black, these colours are common to see in all different kinds of design throughout Asia. These colours of the light in Asia reflect the use of colours in material, which means that there is a wide range of colours. Asia is known for playing around with a lot of colours at the same time, creating a distinctive lighting design.

China also has its own set of characters and symbols; this makes the region unique and can be used within lighting design to contribute to the feeling of belonging and make people identify not only with the symbols but with the entire design of the lighting.

Another thing that is very common to use as a lighting designer is the usage of graphics. Usually, these are used in fixtures, conveying a story or a meaningful part of history. Religion is also a massive part of the graphics used in the fixture.

5.5 Paper 5

A summary of the fifth paper and it's abstract:

The sixth paper is called *Place and Space - Architectural Daylight Design in Traditional Housing in Northern and Southern Regions of Europe***.** The author was published by Aalborg University. The paper is looking into differences in daylight depending on its location in the world and how that has influenced the architectural planning of daylight apertures. The papers discuss the problem in the two sections place and space. The results show that each local light situation should keep in mind the colour, intensity, and distribution as characteristics of the light.

Analysis of the fifth paper:

The paper starts by stating that "characteristics of light are closely linked to the climate of the place in question". The paper describes the sky in Copenhagen as mostly overcast and the sky in Rom as very bright, like sunshine. When looking at the history of architecture in different homes, homes in southern parts of the world are very often designed with large skylights. Letting the sun and natural light be the main source of illumination as the natural light stretches longer throughout the day compared to for example northern parts of the world. The architecture of these homes often involved a fireplace in the middle of the house with a small opening letting some natural light in. The light levels inside Nordic homes were very low which made the contrast from the illuminated sky outdoor to the lighting indoors very strong.

The analysis of this paper shows that shutters are more often to be seen in the southern region rather than in the northern region. Shutters are being used to control the light and to prevent overheating the indoor spaces. The size of the windows in the northern part of the world has always increased with the aim of letting as much daylight in as possible, this is because of the climate conditions in this part of the world, which makes the everyday life spent mostly indoors. The paper concludes that "the place and space correspond when the design of the aperture is taking the specific local daylight situation into consideration, resulting in a functional and beautiful interior".

5.6 Paper 6

A summary of the sixth paper and it's abstract:

The sixth paper is Homely Atmosphere and Lighting Technologies in Denmark: Living with light. The author from the previous article is the same as for this paper, Mikkel Bille from Roskilde University. The author is researching the social life and its connection to light. As stated in the abstract, the paper argues that "there is a cultural and social logic to lighting practices" as stated in the abstract—the paper analyses why people choose to design their homes the way they do with lighting. The paper also discusses other factors besides social life, like politics, norms and geography.

Analysis of the sixth paper:

Mikkel Bille among others describes that the light levels of Scandinavian homes are very low most of the time, and that the northern regions have a focus on dynamic lighting and how it will improve one's health. Well-being and light have become very interesting to researchers in the northern part of the world.

When looking at the history of how different regions placed their exterior fixtures, the paper explains that it was common in England to hang the streetlighting from or near the houses. In Paris, the fixtures were hung in the middle of the street. These two types of placing fixtures can still be seen in these countries today. Another aspect brought up in this paper is how modernism is equalled to light, as can be seen on NASA earth at Night Maps. A more light-polluted area tends to be a more modern society.

Lighting in a country like Zanzibar, which is not as developed as many other countries often connects the light to safety, honour, and gender. Lighting in Borneo (Asia) is seemed to be related to well-being; if one's home is filled with darkness, it reflects someone's anxiety. In Japan, "The incandescent light was seen as 'cold', offering an atmosphere associated with hotels because it was too dark, and made it more difficult to see the normal features of the surroundings, where the informants like to see what I am eating".

What is often seen in Danish magazines portraying the lighting design of Denmark is how all spaces are dimmed, with a reddish light and with a touch of cosiness which in Danish is called "hygge". To contribute to feeling hygge, candlelight is commonly used.

5.7 Paper 7

A summary of the seventh paper and it's abstract:

The seventh paper is called *Lighting and Spatial Structure in Religious Architecture: a comparative study of a Byzantine church and an early Ottoman Mosque in the city of Thessaloniki*. Theodora Antonakaki published this paper through The Bartlett School of Graduate Studies, UCL. This paper compares the differences between the spatial structure and the lighting in early Ottoman mosques and Byzantine churches. The results stated in the article, "Apart from the different religions in Ottoman and Byzantine culture, there are great similarities that involve building types, materials, and construction techniques. In many ways, some of the Byzantine characteristics have evolved through Ottoman culture. At the same time, Early Ottoman religious architecture reflects the balancing of traditional Orthodox themes with the Anatolian and Muslim traditions in the city of Thessaloniki. Yet after all the coexistence and the similar architectural features and techniques, there are still differences in the overall spatial structure and lit appearance of the space that arises from the different forms, essence, and rituals of each religion".

Analysis of the seventh paper:

The paper discusses what role light has in the history of religion. For example, the Egyptians viewed the sun as similar to their god, Ra, the universe's creator. Light has also been linked to Jewish beliefs, Christianity, and Islam.

The light is directly connected to the holy spirit in the orthodox dogma, while Jesus Christ was "thought to be self-luminous". When designing with light in Christian churches, it is essential to place the light in the direction of God. Churches do not often have a uniform light over the space; instead, lighting layers are used. For example, it is divided by 1. Desks which should be around 100-200 lux 2. The altar should be about 300 lux and 3. Pulpit, which should be around 300 lux. The colours of the light should be warm, and the lighting should be diffused and shadowless, not making too many sharp edges with the light.

When designing the light for the Orthodox religion, it is essential to know that the architecture of these places is mainly based on the sunlight and how the sunlight should appear in the interior. The movement inside this church should be ranked high when designing the light; from the very bright exterior, the light in the entrance should be considered. Each zone stepping further into the church should reduce light until the dome which is designed with a higher light level. This place of worship tends to work with lighting in the way it is perceived to be much brighter than it is. Three is the magic number that is often used when designing the interior of Byzantine churches and should therefore also be considered for the lighting design. The lighting is designed to attract worshippers and guide them in the Orthodox religion.

Islam has always had a special bond to light. Quote from the paper “light in the interior of the mosques is the God who is always invisible and everywhere present, in all dimensions of reality, matter or spirit, reason or faith”. In the mosque, it should be possible to pray from everywhere, and therefore the floor should always be illuminated uniformly. Reading the Koran is done on low-reading desks, and the lighting design should be considered compared to Scandinavia, where the lighting for desk height is always calculated at 0.8m. The illuminance of the mosque should be designed with around 300 lux, warm colours of the light and with diffused and shadowless lighting. For Islam, the light is intended to be a symbolic way of enhancing “unison, oneness and unification of the worshippers”.

5.8 Paper 8

A summary of the eighth paper and it's abstract

The last paper is called *Mapping Danish Lighting Trends*. Authors Lone Stidsen, Niels Thuesen and Poul Henning Kirkegaard wrote a section in the Nordic Journal of Architectural Research. The paper analysed different lighting trends in Denmark. The paper aimed to provide documentation of those sensory qualities as they are rarely documented. The analysis is based on a discussion between atmospheres regarding sociocultural aspects of light. The study mainly looks at different horizontal placements one can put their lighting, categorised into High Lighting, Centre Lighting and Low Lighting
zone.

Analysis of the eighth paper:

As previous papers state, this study also refers to the Danish lighting design as "hygge". The Danish lighting design in private homes aims primarily to create a cosy atmosphere. The paper evaluates how Danes design their homes with lighting and categorises
these findings with high, centre, and low. The results indicate that Danes create their workplaces with high light supported by centred light; the low light is mainly placed in the bedrooms. High is also used frequently for corridors and bathrooms, while centred light is the most common way of designing the lighting in living rooms.
The study also indicates that Danes are not very familiar with evenly distributed lighting in their homes. Instead, the Danes try to work a lot with different lighting layers. It is not very common to see the homes in Denmark being equipped with only one primary source, the main source of lighting is instead given by a combination of multiple light sources.

5.8 Conclusion

All the different findings from the analysis of the literature review were categorised into

1. Lighting preference to the placement of light
2. Lighting preference to the colour of light
3. Lighting preference for the distribution of light
4. Lighting preference regards religion
5. Lighting preferences regard to climate/location
6. Lighting preferences to intensity of light
7. Lighting preferences regard feelings and emotions
8. Lighting culture connected to visual perception

The findings can be viewed down below, connected to each category.
The blue colour represents a finding that is connected to Northern Europe.
The red colour represents a finding that is connected to East Asia.
The green colour represents a finding that is connected to The Middle East.
Black colour represents a finding that is not connected to one of the three main cultures for this paper.

The findings that are involving religious preferences are connected to that culture it is mentioned in its paper.

Lighting preferences to placement of light
Southern lighting design is often designed with one main light source
Southern lighting design usually is designed with the main source of light in the ceiling
Northern lighting is often designed with pendants and table lamps
The lighting in Brasilia is sometimes designed with pendants but are most common in higher heights
Candleholders are popular in northern countries
In Berlin the pendants are often not placed over tables
The street lighting in England tends to be placed from or near the houses
The street lighting in Paris tends to be placed in the middle of the street
In Denmark the workplaces are usually designed with lighting at high and centred heights
Low heights of the lighting is usually placed in the bedrooms of the homes in Denmark
In corridors and bathroom in Denmark the lighting is usually placed on a higher height

Figure 43. Own production

Lighting preferences to distribution of light
Northern lighting is often designed with light zones
Southern lighting tends to be designed with uniformed distribution
Northern lighting design focuses on working with contrasts
Lighting design in China is often designed with help of the country's symbols
Lighting design in China is often designed with help of graphics

Figure 44. Own production

Lighting preferences to colour of light
Northern lighting tends to use warmer colour temperatures
Southern lighting tends to use colder colour temperatures
Lighting design in Asia is often designed with colours like cyan, yellow, red, white, and black - calling this "The Five Colours"
In Japan the incandescent lamp is seen as cold as it reminds people of the atmosphere in hotel rooms

Figure 45. Own production

Lighting preferences regards to climate/location
Northern lighting is often influenced by the longer dusk and dawn periods
People in northern part of the world has a strong obsession with sunshine
Dynamic lighting is often used in northern lighting design
Southern lighting design is not often designed with a combination of electric lighting and daylight as the dusk and dawn time are shorter
Shutters are common in The Middle Eastern lighting design
Windows in Northern part of the world tends to be large

Figure 46. Own production

Lighting preferences to intensity of light
Southern lighting is often bright
Northern lighting is often dimmed
Northern lighting is often designed with lower light levels
Southern lighting can be seen as glary, brilliant, colourful while also be using sharp shadows
Lighting in the Middle East is often seen as very bright

Figure 47. Own production

Lighting preferences regards to religion
Lighting design in Asia is often linked to religious beliefs
In Egypt the lighting is strongly connected to the religion
In Christian churches the light should be placed in the direction of God
The lighting for desks in Christian churches should be illuminated with around 100-200 lux
The Altar in Christian churches should be illuminated with around 300 lux
The Pulpit in Christian churches should be illuminated with around 300 lux
The colour temperature in Christian churches should be warm, diffused, and shadowless
In the Byzantine religion the sunlight is important to consider
The movement in Byzantine churches should be focused on
The entrance in Byzantine churches should be bright, to match the exterior, while going further into the church the light should be reduced, except when reaching the dome which should be in a higher light level
In Byzantine churches the lighting levels are usually divided into three, as that is the magic number of the Byzantine religion
The floor in mosques should always be completely uniformed as the entire space is used for praying
Reading the Koran in mosques is often done by lower desks which should be considered in the lighting design
The illuminate in the mosque should be around 300 lux, with a warm colour temperature, that is also diffused and shadowless

Figure 48. Own production

Lighting preferences regards to feelings and emotions
Lighting in Zanzibar is mostly connected to safety, honour and gender
Northern lighting is often seen as minimalistic
Homes that are dark in Borneo can indicate that the person living there is not feeling well, and can even sometimes communicate someone's anxiety

Figure 49. Own production

Lighting culture connected to visual perception
There is attentional focus differenced in change detection and focal detection between East Asians and Westerners

Figure 50. Own production

What is noticeable after the process of the literature review is that the lighting preferences from different cultural backgrounds are influenced by the location of each region. Factors that can influence the one´s preferences are from this literature review, suns altitude, religion, architectural history, language, norms, and economy.

CHAPTER 6

6.0 Lighting Design Tool for Recommendations to Different Cultural Lighting Preferences

6.1 Step 1. – Visual Brainstorming

In creating the Lighting Design Tool for Recommendations to Different Cultural Lighting Preferences, the first step was Visual Brainstorming; the survey and the literature review findings gave a basis for the visual brainstorming model called Mind Map Brainstorming. This mind map should be constructed from the cultural preferences towards lighting.

This was done by firstly starting with the research and how the research is connected to different fields, then secondly how the lighting cultures can be defined by being categorised through different regions, and thirdly how the survey helped explain different aspects of what cultural preferences to lighting could be, lastly ending with the Lighting Design Tool for Recommendations to Different Cultural Lighting Preferences and how this tool could be formed, providing examples in what format the tool should be presented by.

Down below are the results from the Mind Map Brainstorming:

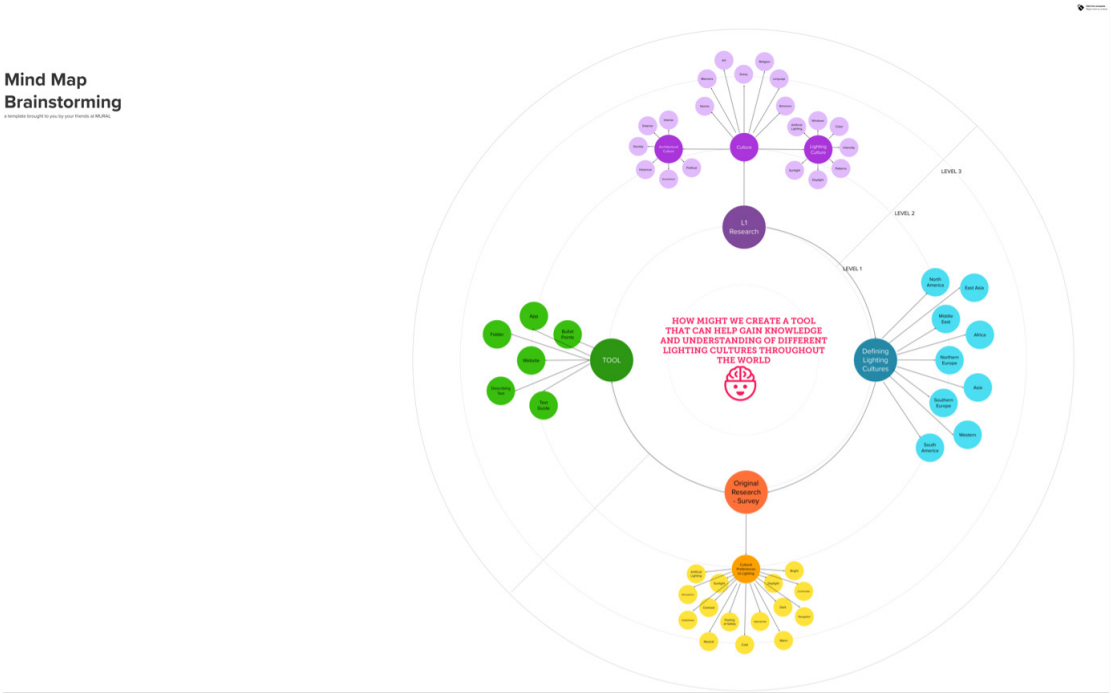

Figure 51. (Mural, 2022)

6.1.1 Key Factors from Step 1.

The critical factors from step 1. Visual Brainstorming was the different ways how to present the Lighting Design Tool for Recommendations to Different Cultural Lighting Preferences. Which were:

1. Text Guide
2. Describing Text
3. Website
4. Folder
5. Bullet Points
6. App

6.2 Step 2. – Bodystorming

The second step in creating the Lighting Design Tool for Recommendations to Different Cultural Lighting Preferences was the Bodystorming. The bodystorming, as mentioned before, was done by the authors will the help of an external person taking the notes from the body storing.

The notes from the bodystorming were as follows:

1. Scenario 1 lighting to lighting designer.
2. Scenario 2 client to lighting designer.
3. Scenario 3 architect to lighting designer.

Notes from scenario 1.
ï Something that shortly categorises different cultures.
ï Something that we as lighting designers can have easy access to.
ï Something that is easy to understand.

Notes from scenario 2.
ï The client would like to have a better understanding of lighting in general.
ï The client wants the lighting to be culturally appropriate.
ï The client wants the lighting installation to be sustainable and contemporary.
ï The tool should help the lighting designer communicate different cultural preferences to lighting.

Notes from scenario 3.
ï Architects want to emphasise the architecture through light.
ï The architect wants the right CCT in regard to building colour in time of the day.
ï The architect wants to avoid glare for workers in the building or residents.
ï Between the architect and the lighting designer, the tool should provide knowledge. about different cultural lighting preferences correlated to daylight.

Other notes:
- Other professionals
- Artists?
- Engineers?

Figure 52. (vecteezy, 2022)

6.3 Key Factors from Step 2.

The bodystorming was a good tool to get a clearer picture of how the tool could be helpful as it had already been displayed. The key factor that came from this session was that is not only something that can or should be used by the lighting designer but is also something to be considered when working together with other professionals that have other backgrounds such as architects, artists, or engineers.

6.4 Step 3. – Visual Product Board

The last step of the creation of the Lighting Design Tool for Recommendations to Different Cultural Lighting Preference was the Visual Product Board. The Visual Product Board was done to identify the vision for the tool in the best possible way. This was done by identifying

1. The Target Group
   - Lighting Designers
   - Architects
   - Manufactures
   - Any Designers
   - Artists
2. The Needs
   - Understanding of cultural differences.
   - Knowledge of cultural differences.
   - Defining cultural differences.
   - Including
3. The Product
   - Lighting Design Tool for Recommendations to Different Cultural Lighting Preferences.
   - Something that is not on the market.
   - Something that is needed on the market.
   - Something important at this time .
4. The Business Goals
   - There are no business goals as the product is contributing to the making of a better society around the world.
5. The Competitors
   - Currently, there have not been any findings of similar products.
6. The Revenue Streams
   - ****
7. The Cost Factors
   - At this time, it has only been recognised to the cost of a possible website in the future.
   - The design for the website service needs to be thought off.
   - Except for this, the authors are financing with their time.
8. The Channels
   - Linked In
   - Networks such as lighting design associations – Examples: Sydljus, Ungt Lys, Danske Center for Lys, IALD.
   - Instagram
   - Facebook
   - Through the potential website.

The result of the Product Vision Board is shown below:

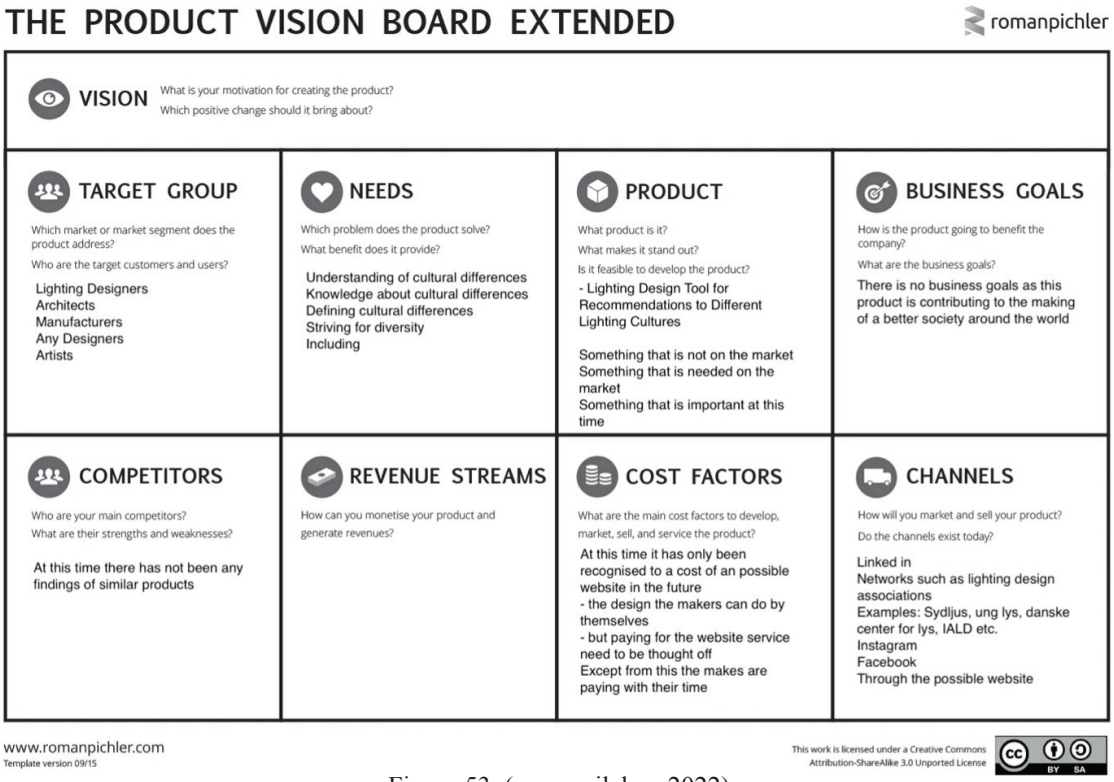

Figure 53. (romanpilcher, 2022)

6.5 Key Factors from Step 3.

The critical factors from step 3. The Product Vision Board identified the different categories on the board and how these factors created the vision for the Lighting Design Tool for Recommendations to Different Cultural Lighting Preference.

The vision goes as follows:

Imagine if there could be a tool which defines different cultural preferences to lighting that lighting designers can operate from, in the creation of new lighting designs. That in the end can lead to knowledge and understanding of different cultural backgrounds connected to lighting.

6.6 Conclusion of Lighting Design Tool for Recommendations to Different Lighting Cultures

The result from the analysis and its creation of the Lighting Design Tool for Recommendations to Different Cultural Lighting Preference was that the Visual Brainstorming and its definition of different ways of presenting the tool:

1. Text Guide
2. Describing Text
3. Website
4. Folder
5. Bullet Points
6. App

And the Bodystorming gave the results:

That the tool should not only be used by the lighting designer but also be considered when working together with other professionals that have other backgrounds such as architects, artists, or engineers.

Together with the Product Vision Board and its creation of the vision for the tool:

Imagine if there could be a tool which defines different cultural preferences to lighting that lighting designers can operate from, in the creation of new lighting designs. That in the end can lead to knowledge and understanding of different cultural backgrounds connected to lighting.

Gave the result of providing the end-user with a website that is categorised into the different findings from the survey and the literature review:

1. Lighting preference to the placement of light.
2. Lighting preference to the colour of light.
3. Lighting preference for the distribution of light.
4. Lighting preference regards religion.
5. Lighting preferences regard to climate/location.
6. Lighting preferences to intensity of light.
7. Lighting preferences regard feelings and emotions.
8. Lighting culture connected to visual perception.

This website is supposed to be used as a guideline for different cultural preferences to lighting, what to think about, what to focus on and what to avoid. It would include having folders for each culture in the world, describing cultural lighting preferences for each culture. Intended to Lighting Designers although it would still be available for other professions as well.

CHAPTER 7

7.0 Challenges

The chapter will give an insight into which challenges emerged while writing this paper. The goal of the paper was to determine differences in lighting regarding culture and combine these aspects to create a reference tool for lighting connected to culture. A short description of the individual challenges will be provided followed by an in-depth explanation.

Defining culture.

While investigating how culture can be defined, the realisation that there is no clear definition came rather quickly.

Significant cultural aspects

Since there is no clear definition of culture it was also not easy to find cultural preferences significant for lighting design.

Survey response

Getting enough participants and enough variety

Experience within the industry

Since the authors of this paper are still students and have not worked in the lighting industry that also presented several challenges.

After the topic for this paper was chosen, the first challenge that presented itself was the definition of culture. Culture in and of itself is hard to define which ends with a lot of different definitions of it. Having no one definition makes it difficult to work with, not only to compare cultures but to also figure out significant aspects of a culture.

Researching cultural significant aspects, helped to narrow down how culture and lighting might be connected. Since culture in and of itself is not easy to define, it makes it even harder to define what of this culture influences lighting. This was especially difficult in the context of cultures the authors of this paper were not as familiar with.

To get input on preferences in lighting from people around the world, a survey was created. The survey presented itself as rather challenging. This is mostly due to the connection the authors have to the topic of the paper. While creating the survey it was not easy to disconnect oneself from the topic of the paper and create questions that would not influence the participants or lead them in any kind of way. The questions of the survey were changed multiple times to create ones that were easily understandable for someone who is not connected to lighting design. The next challenge was to get enough people from around the world to answer the survey. Due to the network of the authors being mostly in northern Europe, it was a task to push the survey to people outside of the author's own area.

Being a student is a challenge itself. Not having the most experiences in the industry of lighting design tends to shift the focus on things that in retrospect might have been less useful than other things. Another challenge that arises from being a student is the limited time to finish a project and restricted resources.

CHAPTER 8

8.0 Discussion & Conclusions

The discussion will be walking through the process of the entire project. It will start with the description of the first initial thoughts for the survey and how this paper ended up focusing on three different cultures. The discussion will touch upon how or if the problem statement has been answered through the process of conducting an opinion poll survey and compiling a literature review.

While answering the problem statement the discussion will contain thoughts and reflections on the three main cultures: Northern Europe, East Asia, The Middle East, other findings not directly linked to a specific culture the general use of defining all these cultural preferences, how this can be presented by a tool, and how that tool can in several outcomes.

The topic of this paper emerged from the feeling of wanting to present a more diverse understanding of different ways of designing light around the globe. This started with the idea of making a survey in the hopes of identifying cultural lighting preferences worldwide. Even though the authors of this paper did not have any longer experiences besides internships working in the profession as a lighting designer, the authors could still recognise a missing component when it came to both the knowledge and the understanding of cultural lighting preferences. The author's knowledge and understanding of lighting design reflect the Scandinavian way of thinking about lighting as both grew up in Scandinavia, studying a Masters in Lighting Design in Copenhagen, Denmark, and having their internships take place in Scandinavia. The Masters of Lighting Design at Aalborg University is an international program and therefore the entire class was mixed with students from multiple countries and cultures. This mix opened the author's minds to other ways of seeing the same designs. The heart of this paper is founded on the feeling of wanting cohesion and inclusiveness. The first intention of the opinion poll survey was to try to include as many cultures as possible in the definition of preferences. Following discussions between the authors and external individuals, it was decided to narrow down the topic in the hopes of providing the problem statement with a more specific answer. From narrowing the topic the three main cultures that were going to be investigated were introduced: Northern Europe, East Asia, and the Middle East.

Through the opinion poll survey and the literature review, did the paper answer the problem statement?

"How can research from a literature review combined with a survey define different cultural preferences to lighting - that can be considered in the creation of new lighting design?"

It can be confirmed that the combination of an opinion poll survey and a literature review answered the problem statement by identifying fifty-four different cultural lighting preferences where thirty-three of them are directly connected to the three main investigated cultures: Northern Europe, East Asia and The Middle East. (see figure 54, 55 & 56)

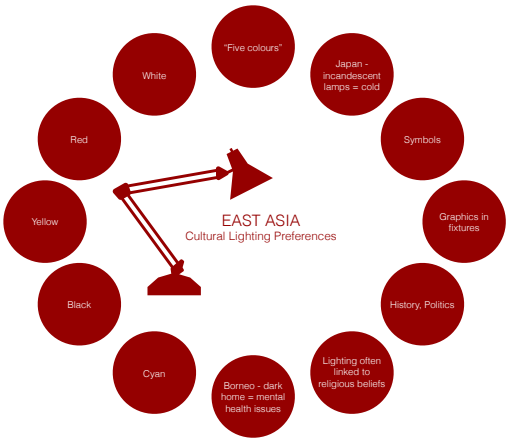

Figure 54. (own production)

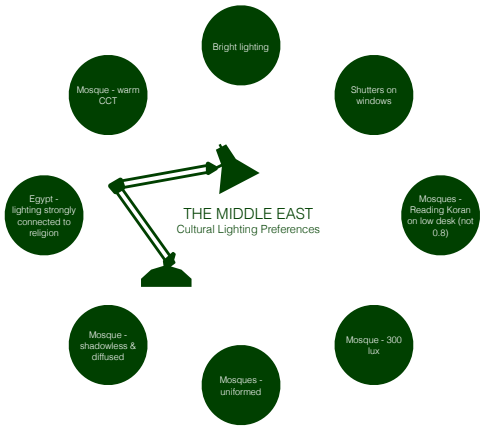

Figure 55. (own production)

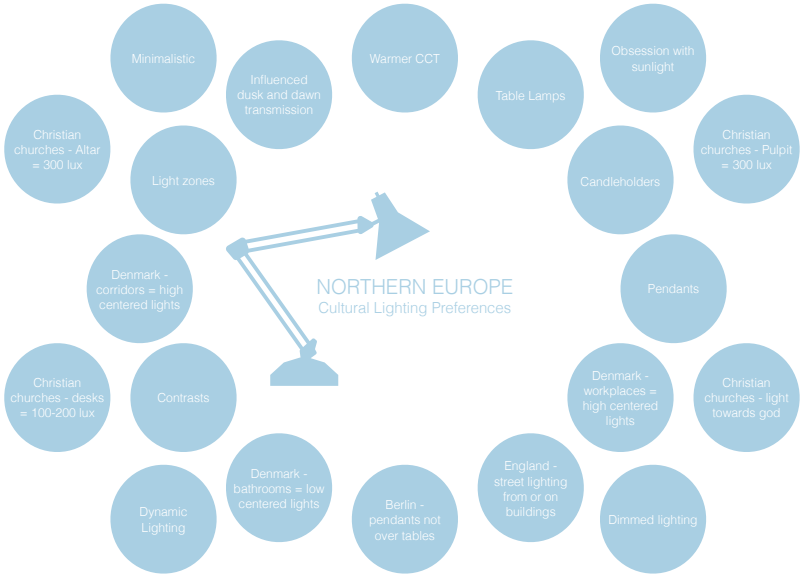

Figure 56 (own production)

Figure 54, 55 & 56 viewing a summary of the findings combined from the opinion poll survey and literature review.

Besides the thirty-three findings that were connected to the main investigated cultures, there were also twenty-four other findings which were still valuable to acknowledge. Some of these findings would be possible to identify as Sothern lighting culture or western culture (USA). The most important was that the problem statement was answered.

Looking at the entire project comparing the findings from the survey and the literature review the preferences from the survey align with the findings from the literature review. As mentioned previously it was crucial to support the findings from the survey with the literature review. Analysing data from the survey and literature review it is safe to say that there is an indication that the cultural preferences for lighting relate to the characteristics of daylight and sunlight. This can be understood from the different architecture and how much the architectural planning is based on the specific daylight and sunlight for each location. It can also be distinguished from the social life and how much time is spent outdoor versus indoors depending on each location. It is also acknowledged that it is impossible to base cultural lighting preferences only on the discovery of this paper, as cultural values and preferences always will be influenced by several different aspects. To get a broader understanding of culture and its effects on lighting there is a strong need for more research.

Most of the findings were from the Northern European culture which is not surprising regarding the author's background. Looking at the findings from East Asia and the Middle East there were a lot fewer discoveries. It would be preferable to collect more findings from these cultures, that match the amount from Northern Europe to support the problem statement further. It is crucial to remember that the discovery in this paper is a start for identifying a difficult subject on a detailed level. Whatever the authors thought they were going to find from their research would always have the meaning of laying the foundation for future work.

As stated in the tool development phase there needed to be a way to present the findings from the paper, that could also be a way of presenting similar findings in the future. The result of this was a potential website. This website would work as a guide for any profession, while it would still be intended for Lighting Designers. The tool that would be in the shape of a website is planned to be named "Lighting Design Tool for Recommendations to Different Cultural Lighting Preference". The website would provide folders that contain different cultural lighting preferences. The hope is added that the website can work as a framework for other outcomes like lighting master plans. Looking at different LMPs (lighting master plans) from around the world, it can be concluded that there is no standard structure or guidelines regarding the creation of an LMP. While some cities use an LMP, others do not, and some of the LMPs are not as comprehensive as others. When tasked with designing light for a city, the only tool for a designer to use would be an LMP. But as mentioned, the quality of LMPs varies and the cultural influence they inhered. This is also why the topic of cultural lighting is interesting having a tool that can help to determine certain cities or areas' cultural significant factors can aid in the design of lighting. In the end, knowing lighting preferences of different cultures and areas can shorten the process of lighting design and create the best and most appropriate outcome.

CHAPTER 9

9.0 Future Work

While looking back at the process of creating this paper, a few things come to mind that would be improved upon in the future. A survey with an equal amount of 20 participants from northern Europe, 20 from east Asia and 20 from the Middle East. Apart from that, the survey would also contain a more extensive approach toward lighting when the participants grew up. To support these efforts to improve the survey, interviews with participants would help a great deal. This would provide a deeper understanding of personal preferences and the reasoning behind them. While there would clearly be a focus on the previously mentioned regions, other cultures should also be further investigated and compared. More time to conduct this research and create a tool would create the groundwork to simplify the topic at hand. The previously conducted research is a big part of the investigation of lighting culture. This is also why an even broader literature review would provide a clearer picture of themes in the individual cultures. The best possible way to investigate public lighting preferences in cultures that might be foreign is to investigate in person though. Seeing how lighting is designed and being able to talk to people that live with it every day would provide data that cannot be obtained through the research of literature.

CHAPTER 10

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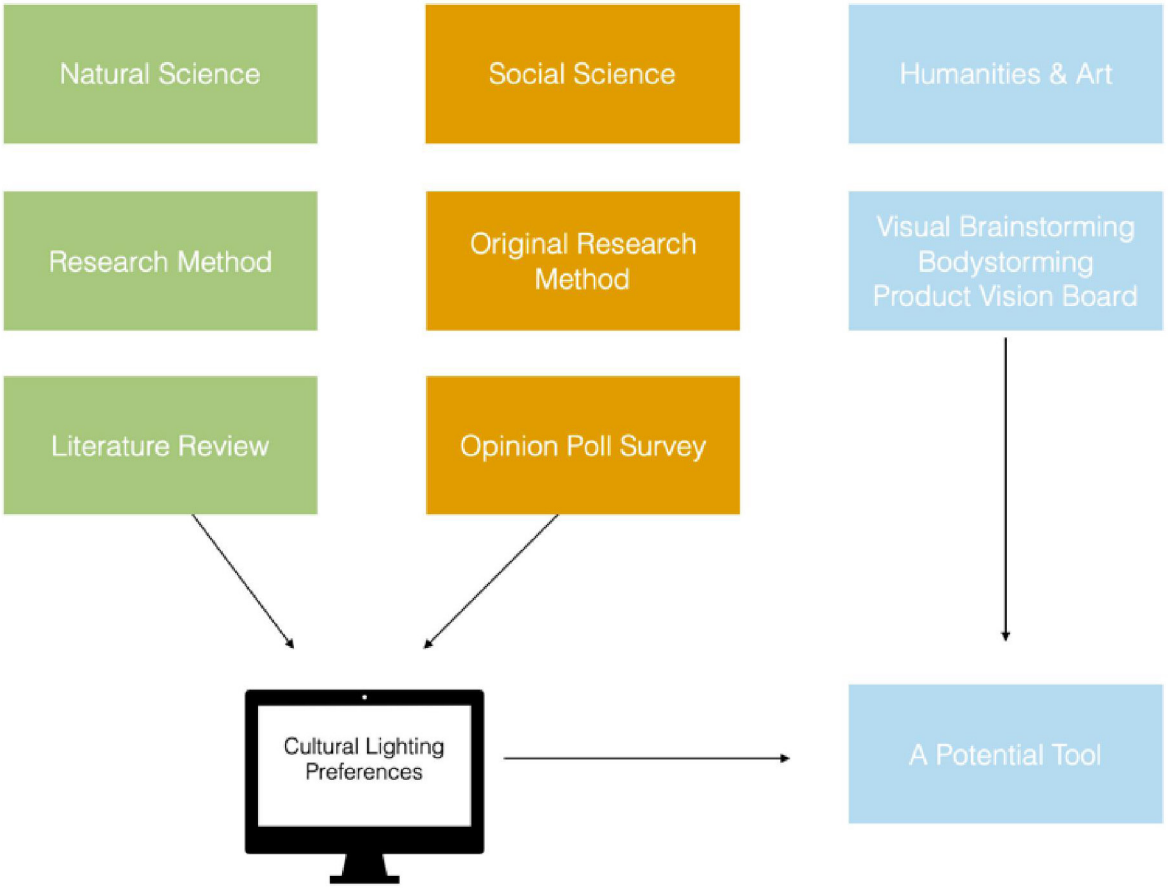
CHAPTER 11

11. Table of Figures

CHAPTER 12

12. Appendix

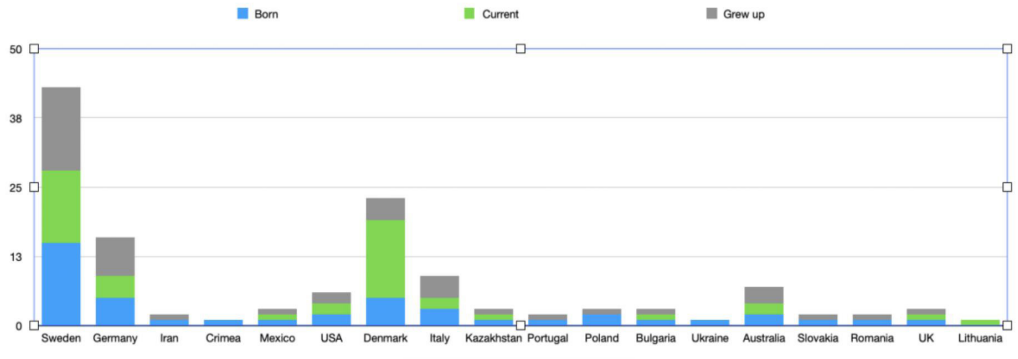
The overall methodology for the thesis



Results

Results from question 1.

Country	Born	Current	Grew up
Sweden	15	13	15
Germany	5	4	7
Iran	1		1
Crimea	1		
Mexico	1	1	1
USA	2	2	2
Denmark	5	14	4
Italy	3	2	4
Kazakhstan	1	1	1
Portugal	1		1
Poland	2		1
Bulgaria	1	1	1
Ukraine	1		
Australia	2	2	3
Slovakia	1		1
Romania	1		1
UK	1	1	1
Lithuania		1	



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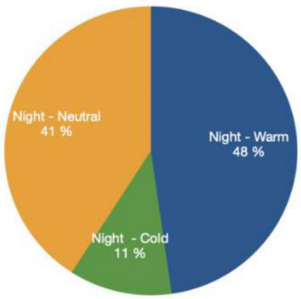
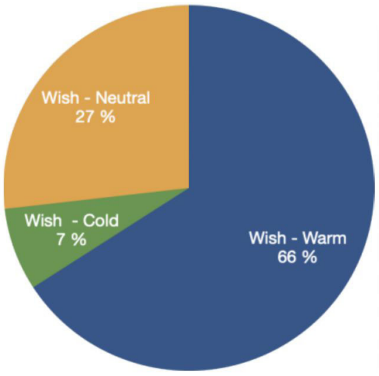


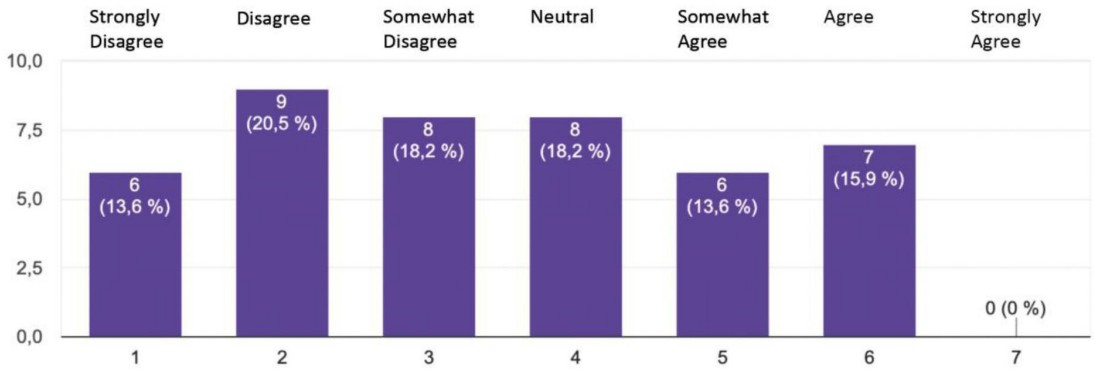
Country	Night - Warm	Night - Cold	Night - Neutral
Sweden	3	3	10
Germany	2		2
Lithuania	1		
Denmark	8		5
UK		1	
USA	1		1
Kazakhstan	1		
Bulgaria	1		
Australia	2		
Italy	1	1	
Mexico	1		

Results from question 4.



Country	Wish - Warm	Wish - Cold	Wish - Neutral
Sweden	10	1	3
Germany	2	1	1
Mexico	1		
USA	2		
Denmark	9	2	1
Italy			2
Kazakhstan	1		
Bulgaria			1
Australia	1		1
UK	1		
Lithuania			1

Results from question 5.



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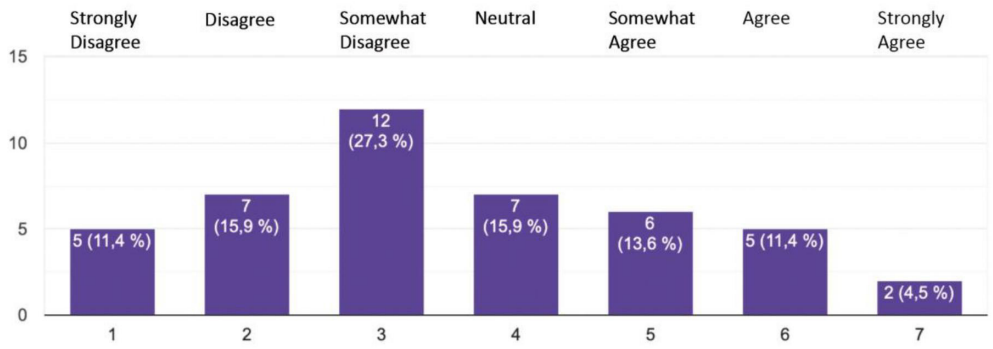

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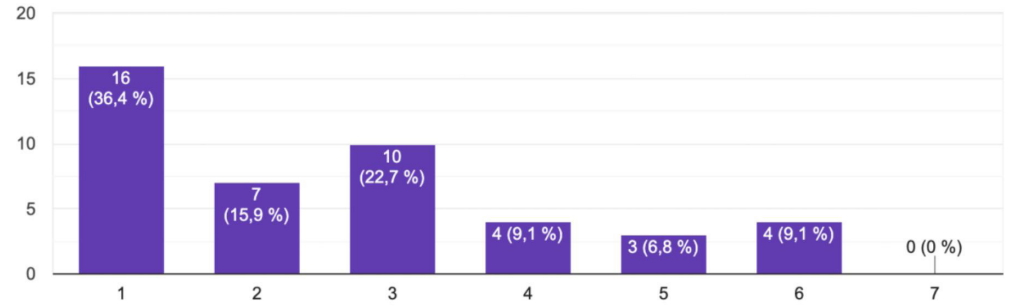

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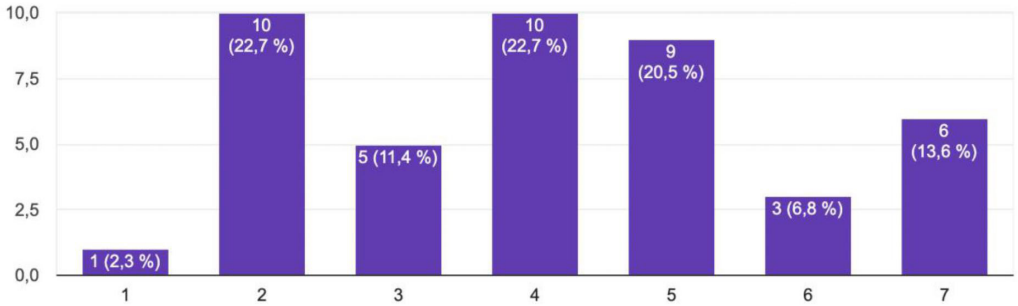

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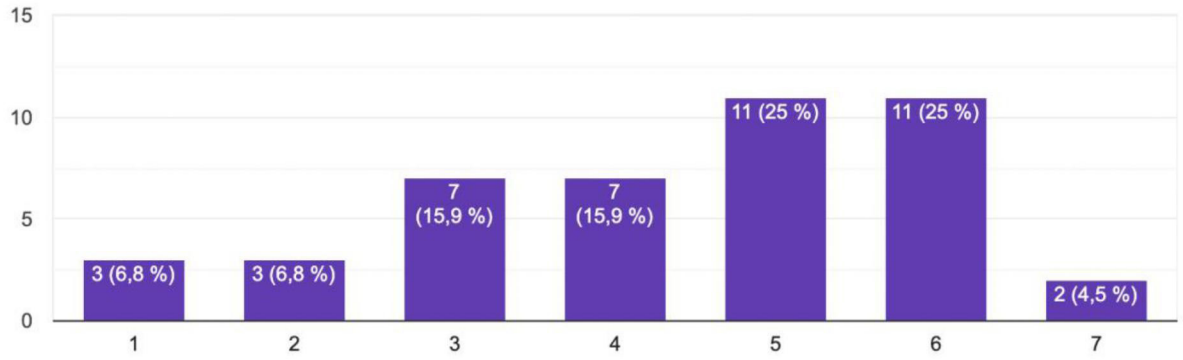

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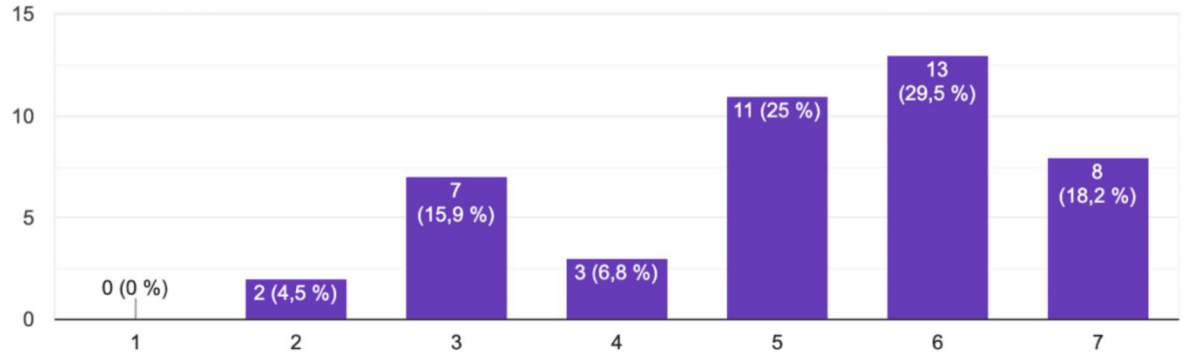

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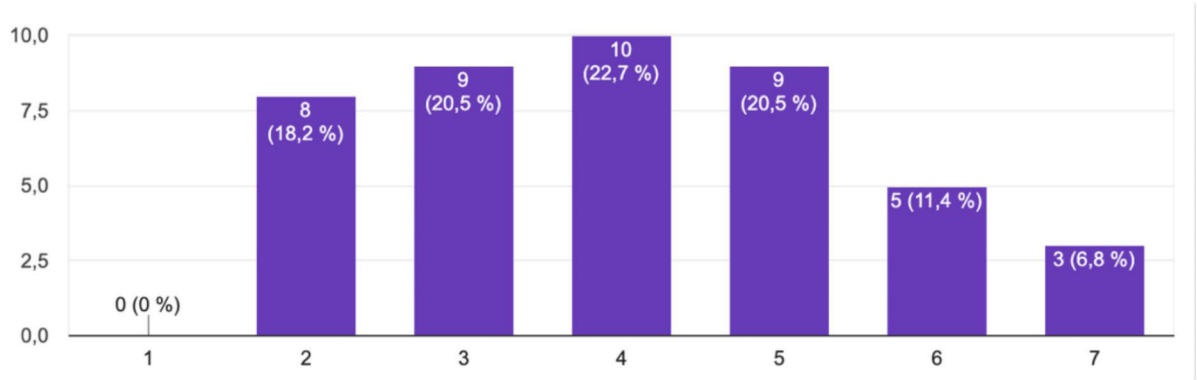

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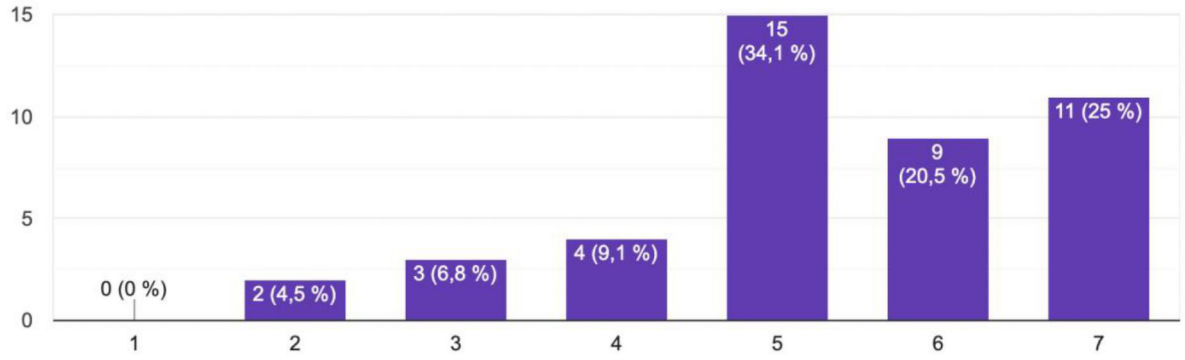

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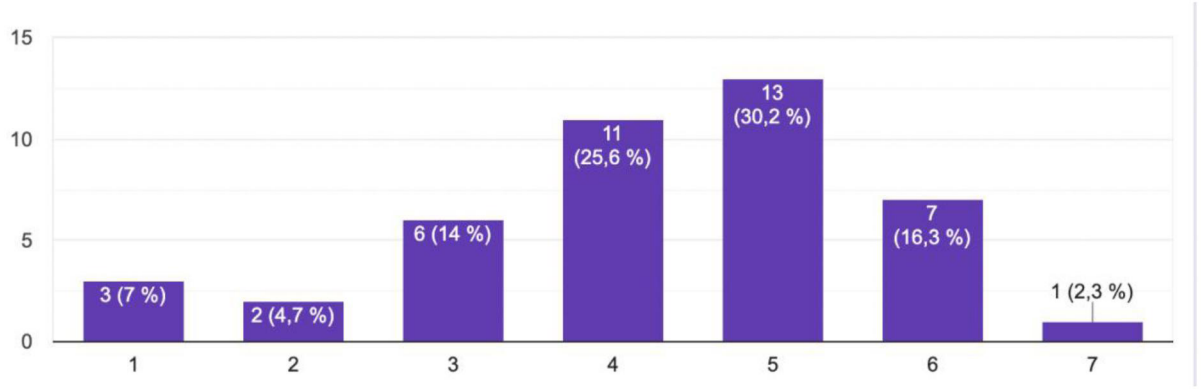

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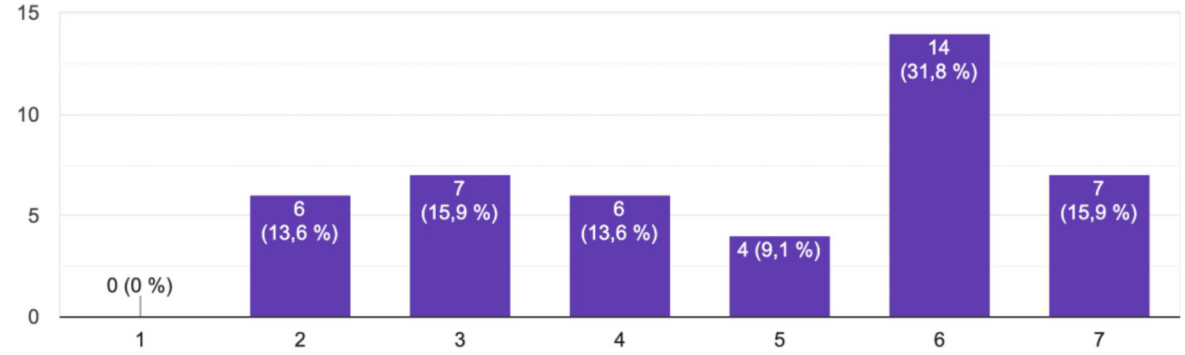

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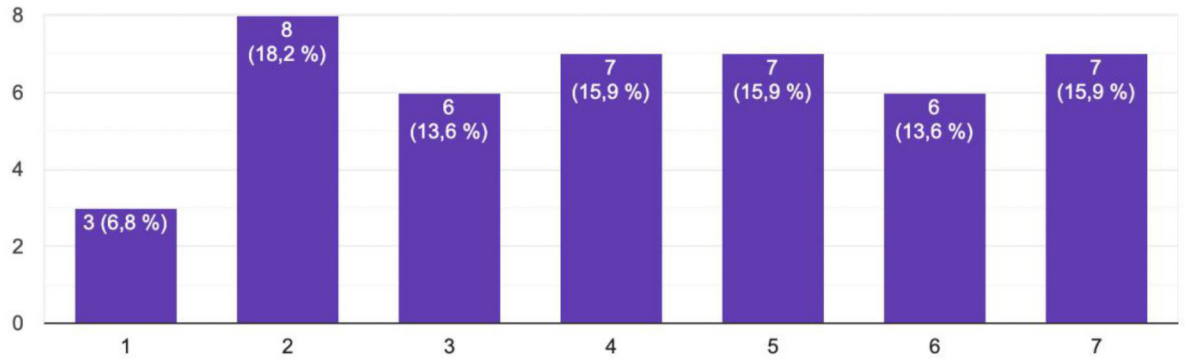

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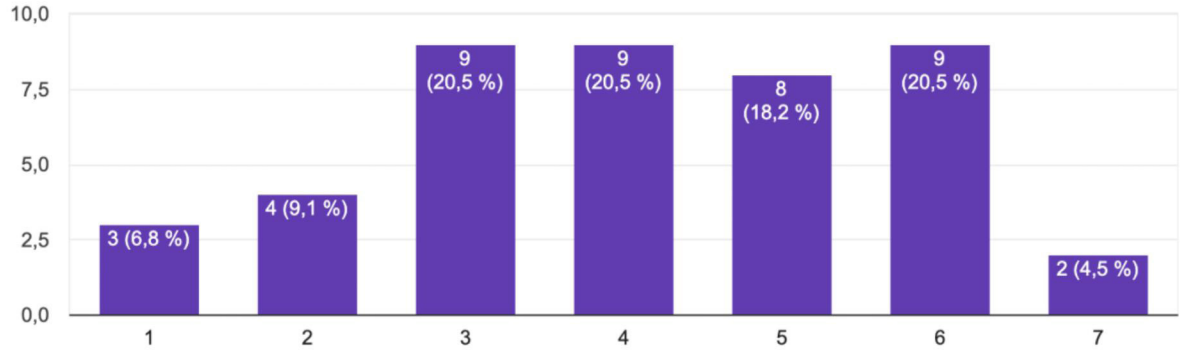

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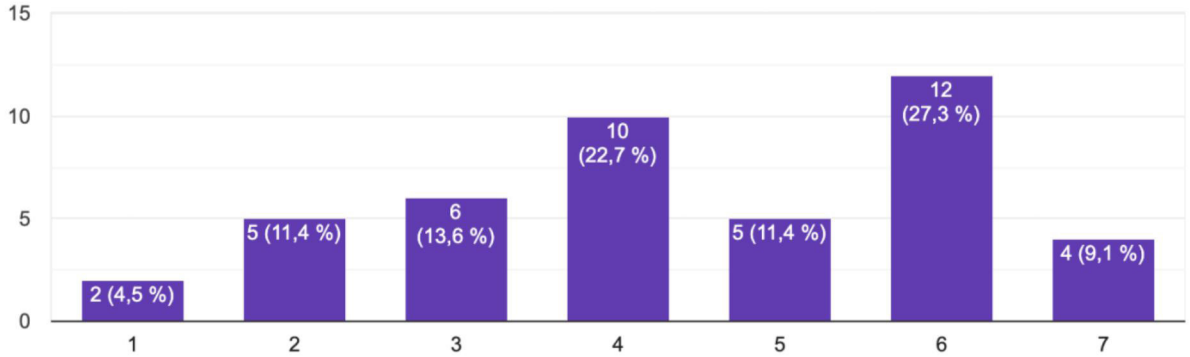

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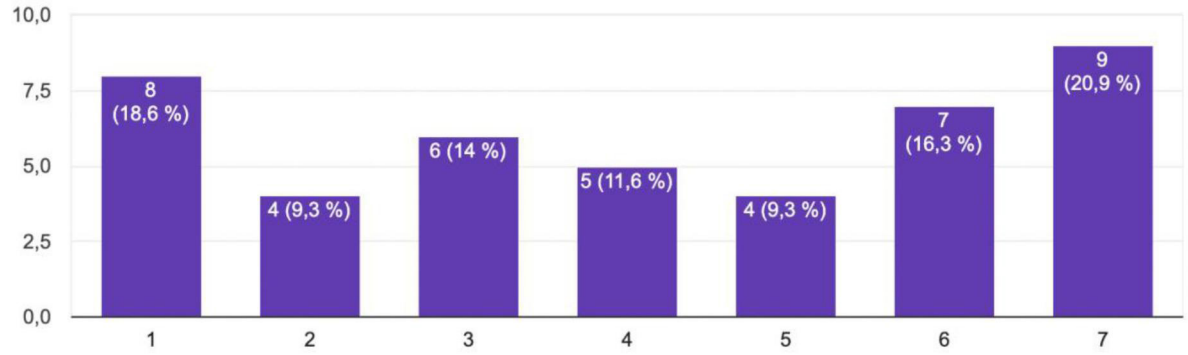
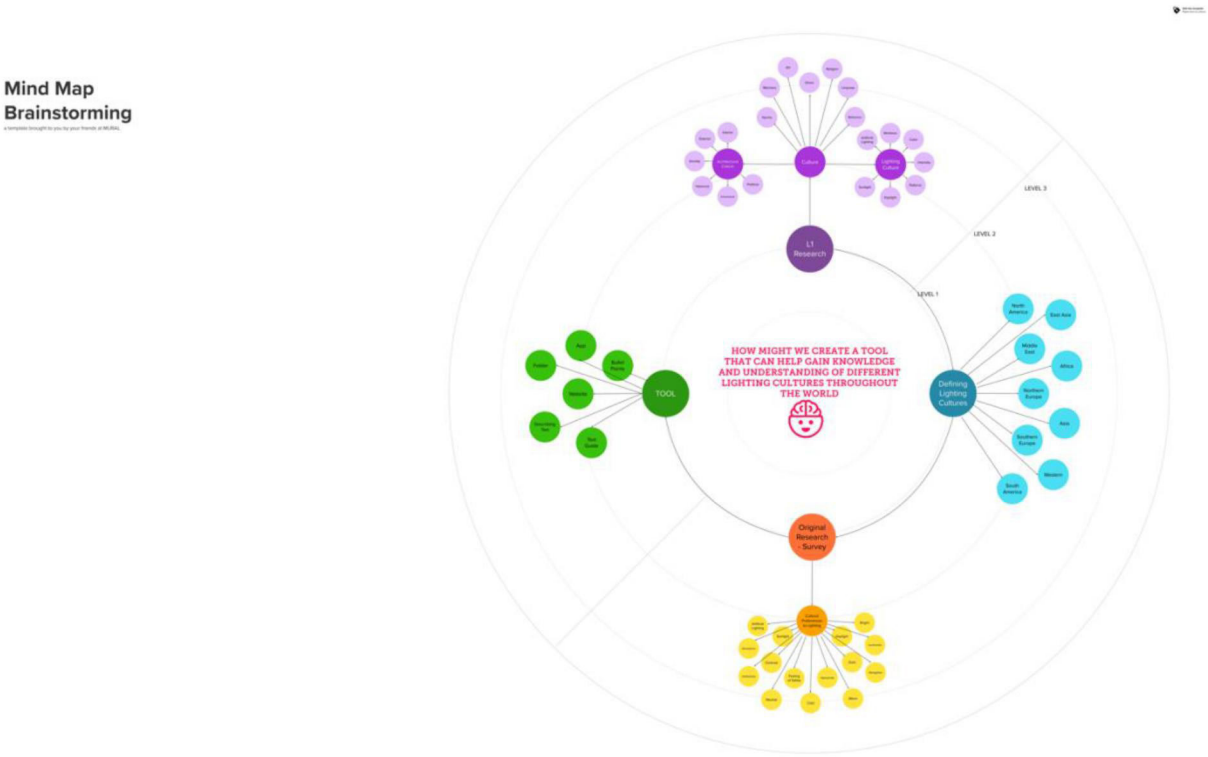


Visual Brainstorming



Bodystorming

The notes from the bodystorming were as follows:

1. Scenario 1 lighting to lighting designer
2. Scenario 2 client to lighting designer
3. Scenario 3 architect to lighting designer

Notes from scenario 1.

- something that shortly categorises different cultures
- Something that we as lighting designers can have easy access to
- Something that is easy to understand

Notes from scenario 2.

- The client would like to have a better understanding of lighting in general
- The client wants the lighting to be culturally appropriate
- The client wants the lighting installation to be sustainable and contemporary
- The tool should help the lighting designer communicate different cultural preferences to lighting

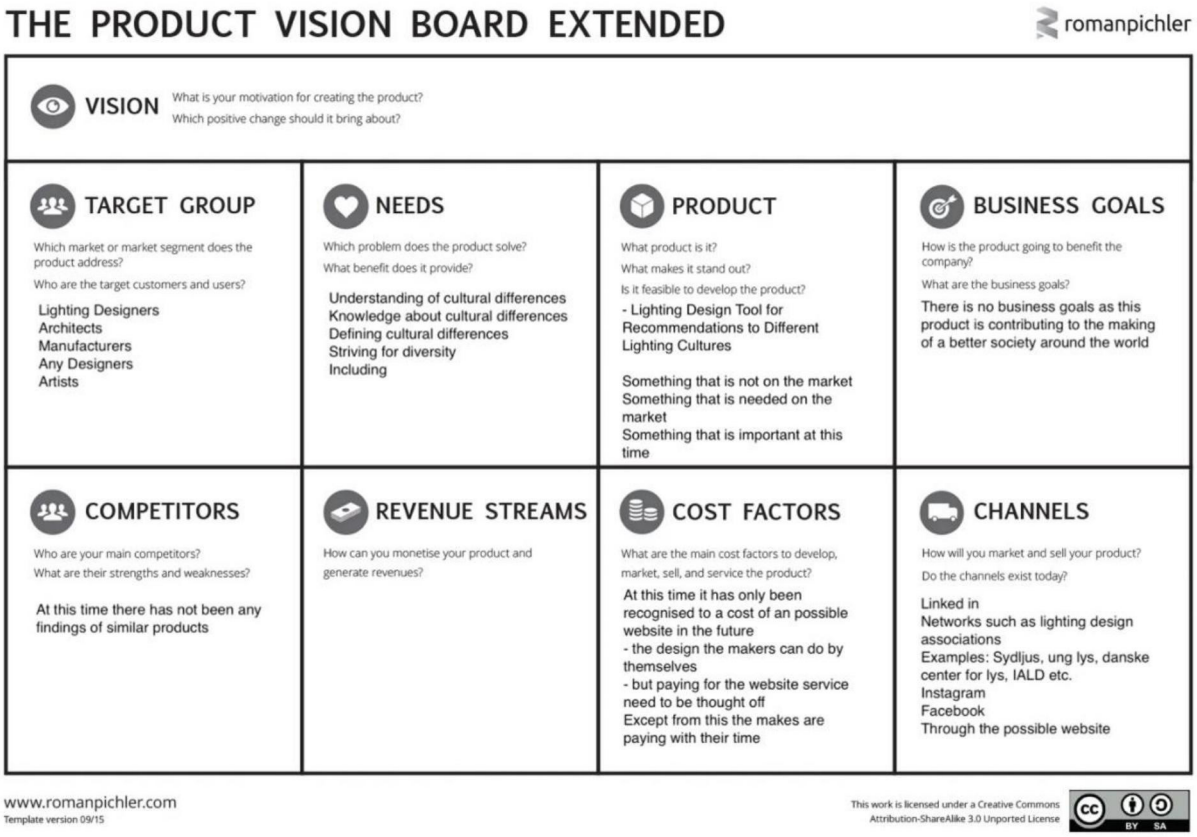
Notes from scenario 3.

- Architects want to emphasise the architecture through light
- The architect wants the right CCT in regard to building colour in time of the day
- The architect wants to avoid glare for workers in the building or residents
- Between the architect and the lighting designer, the tool should provide knowledge about different cultural lighting preferences correlated to daylight

Other notes:

- Other professionals
- Artists?
- Engineers?

Visual Product Board



THE PRODUCT VISION BOARD EXTENDED

romanpichler

VISION

What is your motivation for creating the product?
Which positive change should it bring about?

TARGET GROUP

Which market or market segment does the product address?

Who are the target customers and users?

Lighting Designers
Architects
Manufacturers
Any Designers
Artists

NEEDS

Which problem does the product solve?

What benefit does it provide?

Understanding of cultural differences
Knowledge about cultural differences
Defining cultural differences
Striving for diversity
Including

PRODUCT

What product is it?

What makes it stand out?

Is it feasible to develop the product?

- Lighting Design Tool for Recommendations to Different Lighting Cultures

Something that is not on the market
Something that is needed on the market
Something that is important at this time

BUSINESS GOALS

How is the product going to benefit the company?

What are the business goals?

There is no business goals as this product is contributing to the making of a better society around the world

COMPETITORS

Who are your main competitors?

What are their strengths and weaknesses?

At this time there has not been any findings of similar products

REVENUE STREAMS

How can you monetise your product and generate revenues?

COST FACTORS

What are the main cost factors to develop, market, sell, and service the product?

At this time it has only been recognised to a cost of an possible website in the future
- the design the makers can do by themselves
- but paying for the website service need to be thought off

Except from this the makes are paying with their time

CHANNELS

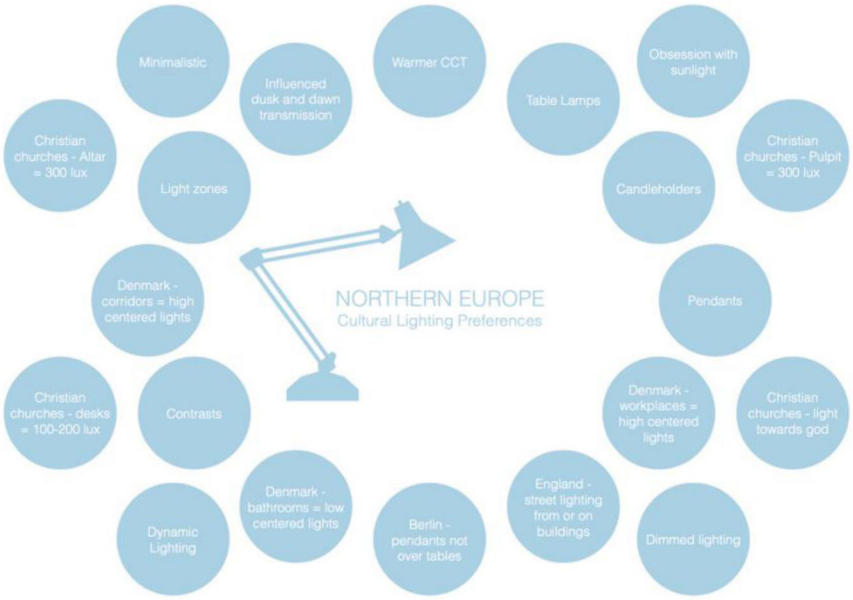
How will you market and sell your product?

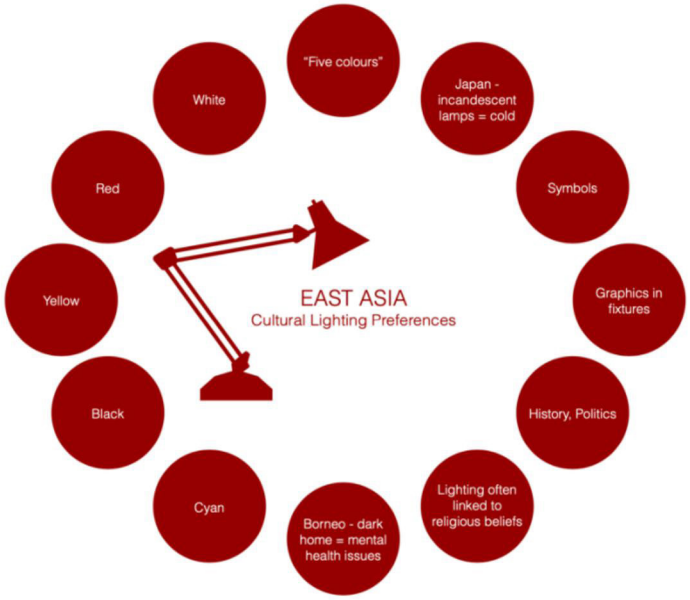
Do the channels exist today?

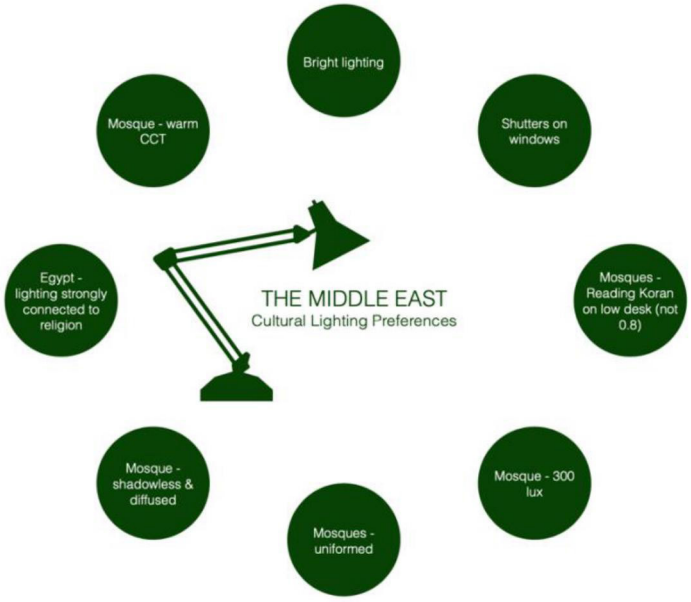
Linked in
Networks such as lighting design associations
Examples: Sydljus, ung lys, danske center for lys, IALD etc.
Instagram
Facebook
Through the possible website

www.romanpichler.com
Template version 09/15

Conclusion


NORTHERN EUROPE
Cultural Lighting Preferences
Minimalistic
Influenced dusk and dawn transmission
Warmer CCT
Table Lamps
Obsession with sunlight
Christian churches - Pulpit = 300 lux
Candleholders
Pendants
Christian churches - light towards god
Denmark - workplaces = high centered lights
Dimmed lighting
England - street lighting from or on buildings
Berlin - pendants not over tables
Denmark - bathrooms = low centered lights
Dynamic Lighting
Contrasts
Christian churches - desks = 100-200 lux
Denmark - corridors = high centered lights
Light zones
Christian churches - Altar = 300 lux


EAST ASIA
Cultural Lighting Preferences
"Five colours"
Japan - incandescent lamps = cold
Symbols
Graphics in fixtures
History, Politics
Lighting often linked to religious beliefs
Borneo - dark home = mental health issues
Cyan
Black
Yellow
Red
White


Bright lighting
Mosque - warm CCT
Shutters on windows
Egypt - lighting strongly connected to religion
THE MIDDLE EAST
Cultural Lighting Preferences
Mosques - Reading Koran on low desk (not 0.8)
Mosque - shadowless & diffused
Mosques - uniformed
Mosque - 300 lux