

To what extent the Enlightenment as a social activity influenced the illumination system on the public street in Europe

Chenglai Ma (Martin)

Harrow International School Beijing, 100102, China

ABSTRACT: *The overall purpose of this paper is to investigate the Enlightenment as a social activity that influenced the illumination system. This study is mainly based on secondary resources, such as “Lighting the Enlightenment: Public Lighting Practices in the Siecle Des Lumieres,” written by Darrin M.McMahon, to develop and make my ideas and thoughts. Moreover, primary resources will be considered to enhance the research. This paper's primary finding is how the Enlightenment influenced and promoted the development of the public lighting system in the streets.*

KEYWORDS: *Enlightenment, Europe, Light, Street lighting, Public illumination, Science, Security.*

Introduction

Enlightenment refers to the general public's ideological and cultural movement in the 17th and 18th centuries, which is another tremendous liberation movement after the Renaissance. With France at the center of the movement, its core idea is “reason,” which dispels the darkness of ignorance with its light. The movement sharply criticized certain aspects of feudalism, religious ignorance, and privilege. It also promoted the ideals of freedom, self-governance, and equality.

Furthermore, the enlightenment movement covered many different fields of studies, for example, natural science, philosophy, politics, and economics. Many theories influencing society were also developed. Public lighting, for instance, is an excellent development of the general public because lighting brought safety in the streets. The historian Craig Koslofsky has recently suggested that the advent of lighting at the end of the seventeenth century was a necessary condition of the Enlightenment, and “a process that liberated and colonized the night.”

“Light has been a symbol and resource of fascination throughout history, drawing our ancestors to the edge of the campfire and prompting their gaze upwards

to the sun and stars.”¹ If people rely solely on natural light, we will remain in the dark for much time. Thus, people started to develop lighting with the development of society. Today, the lighting system is so magnificent that we can observe light virtually everywhere in space. Citizens rely on the light every night since illumination enables people to work and provides recreation conditions. Illumination is so essential that we cannot live without light. In thinking back to when public light first established, Paris is the first city that adopted widespread public street light during the Enlightenment. Light in the period of Enlightenment was not just a metaphor. The pioneering researches of social and urban historians such as Wolfgang Schivelbusch, A. Roger Ekirch, Craig Koslofsky, and Alain Cabanous concluded that the 18th century is the “century of lights in the sense that it witnessed an unprecedented conquest of the dark.”² During 1660, not a single city in Europe had ever built an illuminated street. However, after a century, the situation had changed. Voltaire, a philosopher during the Enlightenment, recorded the transformation, pointing out that “five thousand lamps lighted up Paris every night.”

For one thing, Benjamin Franklin and Antoine Lavoisier during the Enlightenment were interested in lighting and illumination. At that time, a decent number of scholars contributed to the development of lighting technology. Moreover, Benjamin Franklin and Lavoisier studied the ways to improve the illumination system in the public streets. For example, Benjamin Franklin, son of a tallow chandler, took a keen interest in the lighting system's design. Besides, he helped to organize the public illumination in the city of Philadelphia. Lavoisier wrote a paper about the best approach to light a great city and experimented with his theory with different light sources, such as fuels and wicks. He also tested the angle of reflection and refraction in the light emitted from lanterns, and Voltaire tested how flames work.

“Social and urban historians such as Marco Cicchini and Sophie Reculin have been mapping the 18th-century lighting revolution's topography with ever-greater precision, showing how light moved from a luxury to a necessity in the 18th century.”³ Light is a luxury because illumination was expensive in the 18th century, and lighting occurs inside the building, not outside. Ordinary citizens cannot afford the payment for keeping the lighting on all night. When governments decided to construct lanterns on the street, new urban spaces around theaters, for instance, public promenades and squares, were illuminated. “Meanwhile, literary scholars such as Marine Ganofsky have analyzed how illumination transformed the night into an erotic adventure-zone, a space free of fear and open to pleasure, where libertines could frolic.”⁴ Furthermore, this paper needs to explore the relationship between illumination and Enlightenment by reading the formers research papers and primary resources.

1 Darrin McMahon, “Illuminating the enlightenment,” 2018, p119

2 D. McMahon. 2020, Lighting The Enlightenment - Past And Present

3 D. McMahon. 2020, Lighting The Enlightenment - Past And Present

4 Allen, J. 2020, Lighting The Enlightenment - Past And Present.

The objectives are investigating how lighting developed in France during the Enlightenment and how Enlightenment's philosophers contribute to the lighting technology. By understanding the objectives, how Enlightenment influences the lighting system on the public street in Paris should be analyzed. First, the essay will discuss previous research and gather their opinion on my analysis and point out the studies about lighting technology that the philosophers have done during Enlightenment. After that, the result of the research could explicitly conclude.

Literature review

The relationship between the Enlightenment and illumination has a connection, and general illumination is necessary for the Enlightenment. In his article "Lighting the Enlightenment," Darrin M. McMahon pursues the connection between the Enlightenment and the lighting system as a cultural and intellectual phenomenon. Additionally, the Stanford Encyclopedia of Philosophy stated that during the time of Enlightenment, there was tremendous progress in the field of sciences. Thus, human society and life should be improved by developing scientific and intellectual progress. The improved technology helped the public lighting system established in Paris during the Enlightenment. This raises a question: which and what scientific contribution leads to realizing the public lighting system. Newton's success in the early period of Enlightenment contributes to the foundation of science. The passage Enlightenment stated that "Newton introduced the phenomena of nature under universal laws of motion, expressed in simple mathematic formulae, encourages the conception of nature as a very complicated machine."⁵ Studies of light reflection (angle of reflection) and spreading are done; also, there are applied in street light construction. For instance, Lavoisier, he did experiments of using fuels, as well as the angle of reflection and refraction of light in the lanterns.

Moreover, the development of scientific studies could directly be related to the establishment of the public illumination system. Under the context of Enlightenment, many philosophes, Voltaire, for example, published their studies and philosophical theory. The substantial amount of studies, perhaps, open the mind of people and leads to lighting establishment.

Furthermore, the government also has intentions to construct public lighting. Constructing street light is for safety issue at that time. "From the very beginning, public illumination, safety, and hygiene were linked in the minds of French authorities with security concerns driving the quest for lighting innovation and implementation."⁶ I can conclude that public illumination could have a connection with safety and security issues during the 17th to 18th centuries in Europe. "The Light of Lamp-Lanterns: Street lighting in 17th Century Amsterdam" stresses the safety concerns and the potential solutions to solve the concerns, which is the proposal of improving and constructing street light. Furthermore, "Lighting the

5 Bristow William, The Stanford Encyclopedia of Philosophy, 2017

6 Darrin McMahon, illuminating the enlightenment, 2018, p124

Enlightenment: Public Lighting Practices in the Siecle Des Lumieres” also suggested that the illumination is like ‘police’ to prevent thievery in France; “In its close connections with security and sanitation, public illumination was thus conceived as a kind of hygiene and ‘police.’”⁷ Hence, the establishment of street lighting is a solution to prevent crimes from happening.

Investigating to what extent the Enlightenment as a social activity influenced the illumination system on the public street in Europe, the purpose of constructing a light system is essential. The purpose of constructing light should solve problems such as safety issues. According to the previous research studies, during the 18th century in Europe, public security is a mess, so there weren’t people coming out at night. Besides, many people lose their life due to darkness. Because of the darkness, there is a considerable number of people dead, unable to statistics. Hence, it is reasonable to hypothesize that improving security might be the purpose of constructing the lighting system.

For this research paper’s structure, the passage is divided into two sections of discussions: the first discussion is the connection between safety issue and public lighting - to what extent do safety issues accomplish the establishment of public illumination. I believe that public security is closely related to public lighting. During the first discussion, I will review previous studies to conclude the result, for instance, “The Light of Lamp-Lanterns: Street Lighting in 17th Century Amsterdam.” Finding out the connection could help me resolves my research question. For the second discussion, since there were many scientific achievements during the Enlightenment, due to the main concepts of breaking the yoke of thinking, I believe that scientific development must lead to the accomplishment of public lighting. Therefore, second, the discussion will be about how scientific improvements relate to the illumination. To prove my hypothesis, the findings of past scientific achievements, especially the research about illumination, are necessary.

How security system affects the street lighting

During the period of Enlightenment in Western Europe, the cities were experiencing a rapid process of urbanization, and those cities include Pairs. “In the Palace of Versailles, there is a ceiling painting done by Charles le Brun bearing the caption ‘Su[^] rete[^] de la Ville de Paris’ Classical figures of Justice and Order sit atop their royal thrones, gesturing towards a group of brigands in the distant urban landscape, who commit acts of violence under a moonlit sky.”⁸ The painting in the Palace of Versailles reveals the fact that there was an issue of security at night in Paris during the Enlightenment. Establishing lighting in public during the night seems a reasonable approach to solving the safety issue. Hence, lighting could be positively related to the security at that period, and lamps are related to the “justice,” for instance, “One of the soldiers, manly and stern, turns toward Justice. In his hand,

7 Darrin McMahan, illuminating the enlightenment, 2018, p126

8 Darrin McMahan, Illuminating the Enlightenment, 2018, p123

he holds a spear, but in the other, he grasps a lamp, which dissipates the clouds and illuminates the night sky.”⁹ According to Darrin McMahon’s studies, the painting celebrates the creation of the new police force in an urban area in 1667. “In the same year, the inauguration of a public street lighting system in Paris, the first of its kind in Europe, and indeed the world.”¹⁰ The relationship between the police force and the street light is apparent. The police force prompts the establishment of the street light. Besides, “The increasing anxious about threatening attitude of Louis XIV, turned the thoughts of officials to improving the safety and security of the city.”¹¹

Thievery was a severe problem in Europe during the Enlightenment. Since the street was cover in darkness at night, thieves can be rampant for conducting crimes. “The great number of vagabonds and thieves that may be found in Paris after dark.”¹² The darkness is a perfect circumstance for pilfering, and it is hard for police to arrest them. “The majority of said robberies were made by the cover of obscurity and darkness in neighborhoods and on streets without established lanterns.”¹³ Inquiries were made to investigate how the disorders could be prevented. The light source, tallow candle, suspending in the middle of the street, was used for public illumination for the first time. After the lighting in Pairs improved remarkably, the situation of thievery turned better with the help of street lighting.

The security not only includes the prevention of people being rob or murder but also the prevention of people from a stumble. We can imagine that it is hard to detect the road condition when people walk in the darkness. Hence, during medieval times in Amsterdam, street lighting establish prevents people from stumble on the road. In the 17th century, the city started to improve street lighting systematically. “A plan to light the streets submitted in 1688,” stated that the city should provide the lights in order to “prevent the death of many people who, in darkness, fall in the water and drown.”¹⁴ According to the statistics, in today’s society, 640000 people die every year due to stumbling on the street even though there is street lighting. Hence it is reasonable to deduce that stumble is a severe problem during the 17th century. The illumination could directly solve the problem during the past, and this is why there is a proposal for establishing street light in medieval times.

9 Darrin McMahon, *Illuminating the Enlightenment*, 2018, p123

10 Darrin McMahon, *Illuminating the Enlightenment*, 2018, p124

11 Letties S. Multhauf, *The Light of Lamp-Laterns: Street Lighting in 17th Century Amsterdam*, 1985, P236

12 Darrin McMahon, *Illuminating the Enlightenment*, 2018, p126

13 Darrin McMahon, *Illuminating the Enlightenment*, 2018, p126

14 Letties S. Multhauf, *The Light of Lamp-Laterns: Street Lighting in 17th Century Amsterdam*, 1985, P236

How innovations in science affect street lighting

The Enlightenment produces many scientific discoveries. England flourished and started to have the most outstanding scientist and philosophers. “During this Age of Reason, scholars adopted empiricism, proposing the idea that theories should be based upon human observations and experience.”¹⁵ Scholars started to open their minds and break the yoke of the restricted mind. New inventions were arising based on scholars’ observations and experiments. Therefore, the Enlightenment ideology enables scholars to initiate their research. The root of the science development needs to trace back to 1680s England. “Isaac Newton published his ‘Principia Mathematica’ and John Locke his ‘Essay Concerning Human Understanding’ – two works that provided the scientific, mathematical, and philosophical toolkit for the Enlightenment’s significant advances.”¹⁶ Later, philosophes utilized the study of Newton to improve the lighting system; for example, “Marat experimented extensively with fire and light in a quixotic effort to contest Newton’s theory of optics.”¹⁷ Before the research, I made a hypothesis that is during the Enlightenment period. There was considerable scientific improvement. The work that is done by Isaac Newton and John Locke made the basement of the development, which can prove the hypothesis that science was developing indeed during the Enlightenment. “Even more important than the number of lanterns, the intensity and regularity of the light they cast were improved by successive technical innovations.”¹⁸ Based on the mathematical laws, angle of reflection and refraction can be studied to improve the street lighting system. Also, chemistry discovery played an essential role in street lighting. Lavoisier experimented on it.

Voltaire and Madame de Chatelet are both worked on the flame experiments used in the lantern for application. Goethe worked on optics and light, “with the technical aspects of stage lighting and lighting devices mechanics.”¹⁹ Antoine Lavoisier, the father of modern chemistry, discovered that the role of oxygen plays in combustion. During the Enlightenment, the light is using fuels for flame light. In order to keep the flame for an extended period of time, there must be enough oxygen in the lantern for lighting. His study, in some way, affected the design of street light. Lavoisier’s study on the condition of combustion also contributes to the realization of gaslight. For instance, the application of the hydrogen in combustion allowed the tests of gaslight. Besides, his chemical experiments were also working on the efficiency of burning, “chemical experiments made on lamps, to the materials that

¹⁵ Science and the Enlightenment - A Scientific Revolution, 2020

¹⁶ Enlightenment, 2020

¹⁷ Diderot authored the article ‘chandelle’ in the Encyclope´die, available at <https://artflsrv03.uchicago.edu/philologic4/encyclopedie1117/navigate/3/571/4>.

¹⁸ Darrin McMahon, *Illuminating the Enlightenment*, 2018, p128

¹⁹ See Eric Hadley Denton, ‘Goethe’s Mixed Media: The Entertainers in Jahrmaktsfest zu Plundersweilern’, *Goethe Yearbook*, xiii (2005), 31–5

can be burned in the most efficiently, and to the best type of wicks and fuel reservoirs.”²⁰ Bourgeois de Chateaublanc, French mechanical engineer and the inventor of the street lamp, invented the oil lantern for street light composed of an oil burner and metallic light reflectors for the spreading of light (figure 1).

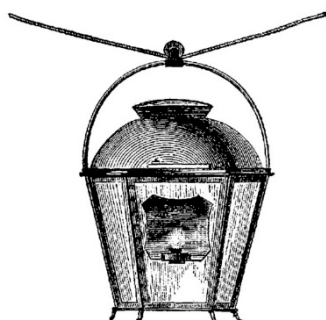


figure 1

The use of the materials of the light is also improved. Since indoor illumination and outdoor illumination are entirely different conditions, for more perfect street lighting utilization, the material should be more suitable for outside conditions. The material should be withstanding wind or rain. In the summer of 1669, Van der Heyden submitted a plan to illumine city street. “Earlier proposals had mentioned placing lanterns and making the lamps of ceramic ‘since copper would occasion too much thievery and tin would leak.’”²¹ In terms of cleaning and the transparency of the light, “Artisans experimented with new types of glass that were clearer and easier to clean.”²²

Conclusion

Answering the research question to what extend the Enlightenment as a social activity influenced the illumination system on the public street in Europe, I analyzed the question in two aspects: safety issues and scientific advances. Safety and security during the Enlightenment influenced the illumination system. The first purpose of constructing light in the public area is that the light could prevent thievery from happening at night. Second, light could also prevent stumble from happening at night because people could see the condition of the road with the light. All those factors lead the government and police force to have intentions of constructing public light. Hence results in the establishment of the street light.

²⁰ Darrin McMahon, *Illuminating the Enlightenment*, 2018, p132

²¹ Letties S. Multhauf, *The Light of Lamp-Laterns: Street Lighting in 17th Century Amsterdam*, 1985, P238

²² Darrin McMahon, *Illuminating the Enlightenment*, 2018, p126

Another aspect that could show that Enlightenment as a social activity influenced the illumination system on the public street in Europe is a substantial scientific improvement. We can see that Newton's mathematical laws provide the foundation for scientific improvements. Based on the math, many calculations could solve and used to study the angle of reflection and refraction of the light. Furthermore, the chemistry field of study enables light to combust efficiently in a long period of time. Mechanical engineers improve the design of the street lantern. All those studies are the products of Enlightenment "reason." Due to Enlightenment thinking, they were scientifically improved by philosophers. Therefore, scientific theories and studies could be applied in street lanterns leading to the realization of the street light. It is reasonable to conclude that the Enlightenment as a social activity directly affected the street light's establishment.

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