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The integrity of air pollution data measurements and their legal implications, a case study in Qatar on air pollution of the French company plume labs

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Abstract: Countries today face immense environmental challenges, with the safety and sustainability of the environment at the forefront of their priorities. Nations, such as Qatar, are committed to addressing air pollution, a significant environmental hazard. To ensure the accuracy of air pollution data, Qatar relies on robust environmental measurement standards, with government institutions playing a crucial role in monitoring and reporting this data. However, the emergence of private companies like Plume Labs, which provide air pollution data for various countries, has raised significant concerns about data accuracy and credibility. These concerns can adversely affect the reputation of nations and impede investment. Notably, Plume Labs has openly stated that it does not guarantee the accuracy of its data, which poses risks to national sovereignty and the integrity of pollution data. Furthermore, there is a lack of clarity regarding the legal recourse available to countries or entities affected by potentially inaccurate data from companies like Plume Labs. Therefore, it is essential to establish a legal framework to regulate the provision of air pollution data by private companies. This framework should include evaluating the accuracy and reliability of data provided by companies such as Plume Labs and determining their legal liability for disseminating inaccurate air pollution information.

Keywords: *Air quality, Electronic applications, Environment, Legal liability, Pollution, Qatar.*

1. Introduction

1.1. General

Countries have made significant efforts to preserve environmental sustainability, which remains a pressing concern. In Qatar, the relevant governmental bodies have not withheld any effort in striving to achieve this goal. Specialized Qatari institutions and newspapers frequently highlight the extensive efforts made to reduce air pollution and its causes, as well as the development of joint strategic plans between several official Qatari entities aimed at achieving sustainability in line with Qatar's Vision 2030.

However, this could only be achieved through the coordination of efforts, starting with the establishment of genuine environmental measurement standards, far from guesses and speculations that do not align with scientific criteria. It is obvious that presenting speculative and inaccurate data about air pollution in a specific area would lead to negative repercussions on both the national and international levels.

The efforts of Qatari national institutions have been clear in reviewing and evaluating the environmental status of development projects and facilities of all kinds, ensuring that they adhere to standards and regulations that prevent air pollution. This task is often assigned to a governmental institution responsible for providing accurate data on air pollution, which is published as factual figures. However, when foreign companies specializing in environmental activities present the public with data on pollution levels, it raises many scientific questions about the standards and methods used to measure pollution, as well as legal questions, such as: What if the data provided by the government institution contradicts that provided by private companies?

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The positive aspect of this is the increase in available data provided by private companies in areas lacking government monitoring capabilities, especially in poorer countries. This enhances transparency and encourages countries to develop effective programs to combat pollution.[1] However, the negative side lies in the potential conflict between the data and its credibility, which may lead to government institutions losing control over the credibility surrounding air pollution, thereby affecting the sovereignty of states.[2]

1.1.1. Reasons for Choosing the Research

There are specialized electronic applications designed and developed by commercial companies in the environmental field, which are installed on users' smartphones and personal computers. These applications inform users about elevated air pollution levels in the area where they reside or plan to visit for work or tourism. As a result, their decisions may be influenced by data that the app. developer cannot guarantee with absolute accuracy. This data could potentially deter global commercial companies from investing in areas indicated to have high levels of air pollution, due to concerns about the consequences of such pollution.

1.1.2. Research Objectives

In today's digital age, air pollution measurement applications on electronic devices aim to provide data that can influence countries' reputations and lead to potential harm, such as the Plume Labs app. developed by the French company Plume Labs (a simplified joint-stock company, SAS) This is one of the leading global companies offering air quality monitoring data by collecting readings from national equipment and devices, as well as from sensors the company sells to consumers. The objective of this research is to examine the legal implications of the data provided by this company regarding air pollution, especially given the concerns about its accuracy.

1.1.3. Core Research Problem

Plume Labs has stated that it cannot guarantee the accuracy of its data, which raises several important legal questions. The most significant is whether this constitutes an infringement on the sovereignty of states and causes confusion regarding their pollution data. Another key question is whether the affected state, or any governmental or private entity harmed by this data, has the legal grounds to sue the French company *Plume Labs*.

1.1.4. Research Plan

Given the scarcity of legal studies addressing this topic, it has been decided that it best to conduct a descriptive and analytical study within the framework of Qatari law. Our goal is to assess the accuracy of the data provided regarding the rise in air pollution levels in Qatar. This will be done by examining the standards used to assess the accuracy of the information provided by *Plume Labs*. The research will then explore the consequences of inaccurate data, especially when the company presents the results as definitive. Additionally, in a preliminary Section, the research will outline the legal status of *Plume Labs*, a leading company in air quality monitoring, which has now become a global player in developing innovative solutions for air quality monitoring.

[1] On the negative effects of air pollution, see, Maysoun Ahmad Ismail : Mardini. (1997). Air Pollution and Its Impact on the Environment. Journal of Education, vol. 26, no. 121, pp. 255–261, at 260. Retrieved from: /24847Record/com.mandumah.search://http

[2] The presence of private companies in monitoring air quality has meant that government agencies are no longer the sole source of air pollution monitoring. For instance, the World Bank's approach, when providing loans and funding to countries for supporting air pollution control, involves assessing the role of both government agencies and private companies. This indicates that private companies have now become a recognized source for providing data on air pollution in a given country. See Yewande Awe, Jostein Nygard, Steinar Larssen, Heejoo Lee, Hari Dulal, and Rahul Kanakia, CLEAN AIR AND HEALTHY LUNGS Enhancing the World Bank's Approach to Air Quality Management, the World Bank. Fabruary 2015. https://openknowledge.worldbank.org/server/api/core/bitstreams/adc5cb50-1d46-56c0-8d47-f952120d9046/content (last visited October 1, 2024).

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1.2. The Legal Status of Plume Labs

It is not common for private companies to take on the responsibility of measuring pollution, as this is typically the duty of governmental institutions. However, the expertise, efficiency, and cost-effectiveness of certain specialized companies have led to the acceptance of the idea of relying on a private company instead of creating and developing governmental programs. This shift highlights *Plume Labs*, which, due to its technical capabilities, has positioned itself as a trusted provider of air quality monitoring solutions, raising questions about its legal standing and its role in what has traditionally been a governmental responsibility.[3]

1.3. The Phenomenon of Expanding Private Companies' Role in Air Pollution Data Collection

The phenomenon began in the United States, with cooperation between the U.S. Environmental Protection Agency (EPA)[4] and private companies to collect air quality data through the "Air Sensor Gateway" program. [5] This practice has since expanded to the European Union, where the European Commission funds the "ICOS" project to establish a network of greenhouse gas monitoring stations across Europe.[6]

Some of these stations are operated by specialized environmental companies, which are legally required to base their operations on scientifically sound principles rather than speculative methods.[7]

Although these companies attempt to absolve themselves of civil and criminal liability for the data they provide through mobile apps, they ultimately publish information that could harm certain countries by holding them responsible for damage they did not cause. On the other hand, these companies may mislead a wide audience of users who assume the data provided by these apps is accurate, when in fact, much of it is still under study and not finalized.

The issue goes further when considering companies like "AccuWeather", an American company founded in 1962,[8] which produces weather forecasts for media outlets and has recently expanded its activities to include obtaining air quality data worldwide.[9]

Despite the fact that "Plume Labs" explicitly states on its website that the real-time air quality information and daily pollution forecasts it provides are not entirely accurate, the company still sells pollution measurement devices to its customers. It also emphasizes that its data has not undergone quality assurance evaluations to ensure accuracy. The company justifies this by claiming that its information is provided for public benefit, and that much of the data it shares about air pollution in various parts of the world is more speculative than definitive. [10]

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[3] Despite the positive aspects of a private company taking on the task of measuring air quality—such as possessing expertise, efficiency, and reducing costs for government agencies—the negative aspects cannot be ignored. One major concern is the risk of relying on a foreign company, allowing it to intervene in a sensitive matter like providing air pollution data for the country. This could result in the state losing control over the story of its pollution levels, especially when the private company presents measurements that differ from those provided by the government. Undoubtedly, the company's data will be more likely to be heard by international bodies such as the World Health Organization and the World Bank.

[4] For more details on the U.S. Environmental Protection Agency (EPA), visit the following website: https:// www.epa.gov/ (last visited October 1, 2024).

[5] **For more on** Air Sensor Toolbox, visit the following website: https://www.epa.gov/air-sensor-toolbox (last visited October 1, 2024).

[6] **See** ICOS improved sensors, network and interoperability for GMES. CORDIS - EU Research results, at https://cordis.europa.eu/project/id/313169/reporting (last visited October 1, 2024).

[7] Certainly, this data has become a legal argument to establish the liability of those causing harmful pollution to the environment and humans. See: Marianne Moliner-Dubost. Le droit face à la pollution atmosphérique et aux changements climatiques. Droit. Université Jean-Moulin Lyon 3, 2001. French. ffNNT: ff. fftel-01627480f, pp. 708–709.

[8] It is a global leader in the field of weather forecasting. For more details, see the following website: https://plumelabs.com/fr / (last visited October 1, 2024).

[9] The primary source of this information is the French company "Plume Labs". For more details, visit its website at: https://plumelabs.com/fr/.

[10] As stated before this company specialises in air pollution measurement. In January 2020, AccuWeather and Plume Labs formed a successful partnership as air pollution emerged as an increasingly widespread global issue. Plume's superior air pollution data was integrated into AccuWeather's forecasts, initially providing up to 96 hours (4 days) of advance predictions. This enabled access to air pollution information and insights for AccuWeather's growing digital audience. At that time, AccuWeather announced that it held a partial ownership stake in Plume Labs, further demonstrating its confidence in the company, the quality of its data, and its significance. See AccuWeather Acquires Plume Labs 24 jan 2022. https://www.prnewswire.com.

See the website of the French company at: https://plumelabs.zendesk.com/hc/fr/articles/360025555533-Quelle-est-la-Pr%C3%A9cision-de-Flow

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1.4. Methods Used by Plume Labs to Collect Air Pollution Data

Plume Labs primarily derives its air quality monitoring information from readings of national equipment and devices in each country, as well as from the sensors it sells to consumers.[11] These sensors detect fluctuations that occur from time to time, although these readings are often uncertain or inaccurate. All information and data related to air quality are derived from a set of independent air monitoring data values based on recorded concentrations of major pollutants for each day.

Plume Labs then converts these initial measurements into values that constitute the Air Quality Index (AQI) using standards and guidelines developed by the Environmental Protection Agency (EPA)[12] and the World Health Organization (WHO).[13] The French company obtains air quality information and data from various specialized institutions, which frequently update their information.

Despite the variability of this information, *Plume Labs* makes it available to the public through the app it developed, as well as sharing it with other companies like *AccuWeather*, which presents it as semi-verified data. This raises important legal discussions regarding the implications of such practices.[14] The significance of this discussion centers on *Plume Labs*' ability to distribute speculative rather than definitive data for profit.[15] Consequently, it becomes difficult to prevent the Ministry of Environment and individuals (both natural and judicial) who are harmed by inaccurate information from suing *Plume Labs*.[16]

1.5. Plume Labs Developing an Electronic Application for Air Pollution Data

The *Plume Labs* app can be downloaded from the Play Store and utilizes GPS technology to update air quality data through sensors purchased by consumers. When users are located in a specific area, the air quality measurement device assesses the pollution levels in that location and connects this data to the app, making the results available to all app users.

This functionality raises significant legal questions regarding the company's ability to disclaim legal responsibility for the accuracy of the information and data related to air quality in a specific area, especially when it publishes information indicating that the pollution levels are high or otherwise.

1.6. The Legal Framework for Plume Labs' Activities in Collecting Air Pollution Data

It is essential that official entities, represented in Qatar by the Ministry of Environment and Climate Change, undertake the task of measuring air pollution. This process relies on high-precision analytical devices operated by specialized environmental personnel capable of interpreting the measurements to determine air pollution levels. This means that the ministry serves as the primary source for air pollution measurement data.

However, with the emergence of the information network in our contemporary world, it has established itself as a major source of information across various scientific, social, political, and environmental fields. This opportunity has been seized by private companies and regional and international organizations, allowing them to manage issues that were once the purview of governmental institutions in each country through electronic applications. Consequently, these entities

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[11] We will later explain the value of these devices and how they work.

[12] You can view the website of the United States Environmental Protection Agency (EPA) at the following link: https://www.epa.gov/environmental-topics/air-topics

[13] You can visit the World Health Organization (WHO) website at the following link: https://www.who.int/home

[14] The difficulties faced by countries in the field of air pollution vary, starting with accurately diagnosing the state of pollution and preventing the spread of false advertisements about a nonexistent pollution situation. See: Tarek Khlan Al-Abyad, "The Legal System for Combating Air Pollution," PhD thesis submitted to the University of Aleppo, 2018, p. 202 *et seq.*

[15] Marianne Moliner-Dubost. Le droit face à la pollution atmosphérique et aux changements climatiques. Doctoral thesis in Law, Université Jean-Moulin Lyon 3, 2001. French. ffNNT: fftel-01627480.

[16] A state can sue any foreign company that damages its reputation, provided that the jurisdiction, type of harm, and evidence are clearly defined. There are many examples of states suing foreign companies for harming national interests. For instance, in 2018, a French court ordered Facebook to pay a fine of 150 million euros for violating data protection laws. In 2021, a U.S. court ordered Huawei to pay a fine of 1 billion dollars for violating U.S. sanctions. Therefore, there is nothing preventing a state from suing any foreign company that harms its institutions. See: **Facebook Case in France (2018) at the following link:** https://www.bbc.co.uk/news/technology-65669839 And the the case of Huawei v. the U.S. Department of Justice at the following link: https://www.justice.gov/opa/pr/chinese-telecommunications-conglomerate-huawei-and-subsidiaries-charged-racketeering

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began to publish information and data that significantly influence individuals and businesses, creating a situation that did not exist prior to the widespread use of these applications.

While these applications have played a positive role by facilitating information access and presentation, they also have a negative aspect, as they contribute to the confusion of information for users of the electronic application. This can lead to misleading conclusions that harm various entities, whether governmental or private. This latter point is what we will focus on, specifically regarding the application used by Plume Labs to measure air pollution levels in various countries and its sale of the Flow 2 air quality measurement device to consumers.[17] Such companies have granted themselves the authority to measure and collect information about air pollution globally and present this information to an unrestricted audience.

Thus, the discussion of legal obligations and responsibilities arising from violations of these obligations is essential, necessitating the establishment of regulatory frameworks to ensure the accuracy of electronic applications. We will address this in the section two. The failure to adhere to these standards leads to civil liability arising from the inaccuracies of Plume Labs' application, which will be covered in the third section.

2. Standards for Ensuring the Accuracy of Plume Labs' Application

Despite the significance of the electronic application developed by Plume Labs, which has been praised by various entities for providing consumers with valuable information about air pollution levels in different regions of the world, there are associated risks that can be divided into two categories:

Mechanism of Data Collection: The first category pertains to the methods by which Plume Labs obtains its information.

Privacy of Information: The second category relates to the privacy of the information that must be disclosed, as it involves data that is linked to third parties, specifically governmental institutions in each country. The presentation of such information carries the risk of causing harm—whether intentionally or unintentionally—to these third parties, potentially impacting their reputation and operations.

2.1. Technical Standards Surrounding the Accuracy of Air Pollution Data Readings

Many questions arise regarding the scientific value of the information provided by Plume Labs about the levels of pollution collected. How accurate is it? Is a sensor carried by individuals sufficient for them to have information about the pollution levels in a specific city around the world? In order for this data to be adopted in the electronic application, we will question the nature of the relationship between the company and the consumer and assess the accuracy of the information provided by the company regarding air pollution levels in Qatar.

2.1.1. The Legal Relationship Between Plume Labs and Application Users

The importance of the application lies in its ability to provide users with information about air quality and pollution levels in the city where they reside or the city they plan to visit. By selecting the name of a city within the Plume Labs application, users can access information regarding the concentrations of fine particulate matter in the air (PM2.5) in Qatar. This includes various components such as nitrogen oxides and volatile organic compounds, whether these details pertain to current measurements or forecasted data for the specified timeframe in the chosen location.[18]

2.1.1.1. The Contractual Relationship Between Application Users and Plume Labs

The service provided by the application[19] grants users accurate information about their current location, the place they intend to visit, or the physical activities and daily habits they wish to engage in.

[17] Plume Labs is a French simplified joint-stock company ("Société par Actions Simplifiée"), registered in the Trade and Companies Register in Paris, where its headquarters are located. The company has made an application available to the public that can be downloaded for free on smartphones. This app allows users to activate it as an anonymous user under certain conditions or as a registered user by providing personal information to become an active follower within the company's application.

[18] The information displayed by the application is proprietary to the company, and users are not permitted to record or save it.

[19] See the website of Plume Labs at: https://tutorial.plumelabs.com/post/terms_of_use/

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Users have the option to activate the alert system within the application, which notifies them of pollution levels and their severity in their current location. When pollution levels are high, users who have activated this service will receive a warning message.[20] This information is available for free to everyone, but it requires a subscription to Plume Labs. Notably, the company allows subscribers the right to withdraw from the service within 14 business days from the subscription date.[21]

However, by agreeing to the terms, the user is financially obligated to the company and must comply with the requirements regarding the protection of the provided data. The data and information utilized by the application are considered the property of the company. Furthermore, Plume Labs stipulates in its agreement with the user that it disclaims responsibility if individuals who are not signatories to the agreement use this data and information. In essence, this establishes a contractual relationship between the application user and Plume Labs.

2.1.1.2. Mutual Obligations Between Application Users and Plume Labs

To ensure the continued service for application users and to provide them with accurate information, users are obligated to inform Plume Labs of any difficulties they encounter while using the app. In return, the company disclaims responsibility regarding air quality. As the company states, the application provides users with an additional solution, not a substitute, for obtaining knowledge about air quality and pollution. This solution cannot replace other methods that users may rely on elsewhere to achieve the same goal.[22]

The agreement between the company and the application user prohibits any actions that could harm the company's reputation or the information and data it provides to users.

Upon analyzing the agreement, it becomes clear that the company's obligation is one of due diligence rather than guaranteeing results. It offers approximate information rather than definitive data about every location where the user may be present. The warning nature of the application is predominant; it does not treat the air pollution situation itself but rather warns individuals of heightened pollution levels in a given area and advises them to move to a safer, less polluted environment.[23]

2.1.2. The Scientific Functionality of the Application and Its Legal Implications

The situation differs significantly between an electronic application created by a company that merely compiles existing information and one that takes a leading role in providing information that may contradict scientifically established data issued by official authorities or private companies contracted with governmental entities. This contradiction will undoubtedly lead to confusion and potential harm, which the manufacturer of the application must bear legal responsibility for.[24] The legal implications of this situation can be analyzed from several angles:

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[20] This is what Article 7 of the agreement states:
.Services are provided free of charge **7**.

[21] See Article 8 of the Agreement: "Users are informed that they benefit a right of withdrawal for a period of 14 (fourteen) working days from the date of their subscription to the Application. They may exercise this right by unsubscribing as set forth in article 18."
Article 18 provides that:
"18. TERM OF THE SERVICES, CANCELLATION Subscription to Services is taken out by Users for an unlimited term. Users can opt out of the Services at any time, by uninstalling the Application. Their subscription shall be cancelled immediately."

[22] See the Article 14 (2):
"14.2 : Plume Labs does not guarantee to the Users that the Application and the Services, which are subject to constant research to improve their performance and progress, will be totally free of errors, faults or defects. In any event, Plume Labs reserves the right to interrupt access to the Application momentarily for maintenance purposes. In the same way, Plume Labs shall not be held liable if the Application is ever momentarily difficult (or impossible) to access, the causes of these circumstances being outside Plume Labs' control, force majeure, or due to any disruption in the telecommunications network."

[23] See Article 14(1):
"14.1: Plume Labs undertakes to provide the Services with diligence and in compliance with trade practice, specifying that it has an obligation to provide due care, but this without any obligation of result, and this is expressly acknowledged and agreed by Users. More specifically, Users expressly acknowledge and accept: - that the Application is aimed at providing information on the air quality and pollution in specific places but is not designed to enable Users to prevent pollution or to improve their quality of life, - that the forecasts on air quality and pollution result from the analysis of public data over which Plume Labs has no control."

[24] It is important in this context to clarify the community's right to know environmental secrets; however, this must not be based on distorted or speculative information. A person providing information about a city claiming it is polluted cannot simply state that this information is

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2.1.2.1. Plume Labs' Role in Place of the Ministry of Environment in Qatar

Upon reviewing the Plume Labs website, researchers have found that it presents information about air pollution levels in Qatar without prior coordination with official authorities, as is the case in many countries around the world.[25] Consequently, the information regarding air pollution levels provided by the company's application may contradict the official data from relevant authorities.

In this way, Plume Labs assumes a leading role—without authorization—in directing the public, particularly foreign residents and visitors to Qatar, with information that may be inaccurate or at least speculative, potentially harming Qatar's reputation. This raises the possibility for affected parties to pursue legal action against the company.

2.1.2.2. Confusion over Information Provided to Official Authorities

In response to social media claims that classified Qatar as one of the high-pollution countries in terms of air quality, a responsible source from the Ministry of Environment in Qatar[26] commented that the information published on the World Health Organization's website refers to a table of particulate matter concentrations in the air (dust) rather than environmental pollution. Furthermore, the organization did not issue a ranking of countries by pollution, which some entities circulated based on posts on social media. This implies that private companies, such as Plume Labs, have taken it upon themselves to assume a role that may confuse true information with inaccurate speculative data for financial gain.

Experts at the Qatari Ministry of Environment believe that the updated table from 2016, which relates to particulate matter concentrations, shows Qatar's pollution levels ranking it 41st among countries. In other words, the available devices measure all particles in the air, including dust and humidity, which contributes to high pollution readings in Doha. The published information did not originate from the official authority, the Qatari Ministry of Environment, which has had a plan since 2014 to update devices and monitoring methods for particulate matter and pollution, enabling direct air quality monitoring through the ministry's precise monitoring stations. These stations have increased from three fixed and developed stations along with 22 mobile environmental monitoring stations in 2016 to 40 fixed and mobile stations spread across various areas of the country by 2022.

The Qatari Minister of Environment and Climate Change confirmed that pollution levels are lower than normal or within natural limits, explaining the difference between natural pollutants, like dust, which are less harmful than industrial pollutants.[27] The Environmental Data Monitoring and Analysis Unit in Qatar provides high-accuracy data on air quality and identifies sources of pollution and their impact.[28] For instance, the presence of dust in Qatar is a result of its climatic nature and vast desert areas, alongside changing wind speeds according to the seasons. All these factors contribute to an indication of increased pollution levels, which are natural and momentary. This makes personal

unverified. The consequences of such claims are significant, as we are not dealing with a historical narrative that accepts multiple viewpoints on the issue. Therefore, if there is an application regarding air pollution, it must align with the official information from the state, or it should contradict the official data and substantiate the accuracy of the app's information based on scientific foundations and established air quality standards. For more on the necessity of obtaining accurate information according to international standards, see: Yahya Shaqir, "The Compatibility of the Law Guaranteeing the Right to Access Information in Jordan with International Standards," PhD thesis submitted to the Middle East University, Jordan, 2012, p. 92 *et seq.*

[25] What supports the claim that the information is speculative is that AccuWeather acknowledges that the data and information related to air quality and its forecasts are uncertain and do not guarantee their accuracy. The information related to real-time air quality maps reflects pollution levels every day and every hour, which AccuWeather receives and provides for public benefit. However, the readings may not be accurate or definitive, as the company sources this information from Plume Labs. Therefore, AccuWeather explicitly states that it does not assume legal responsibility for the accuracy, completeness, or correctness of air quality data and information, and it disclaims liability for any damages or losses caused. The contentious issue is whether a company can provide uncertain information about areas and cities in various countries in a manner that may harm the reputation of those countries, under the pretext of protecting individuals' health from air pollution that may not even exist. For more information, see: https://www.accuweather.com/en/qa/doha/271669/air-quality-index/271669

[26] The Ministry of Environment and Climate Change was established under Decision No. (57) of 2021 issued by His Highness Sheikh Tamim bin Hamad Al Thani to define the competencies of ministries, after having previously been part of the Ministry of Municipality and Environment. For more information, visit the following website: https://envsustainability.mecc.gov.qa/ar/about-ministry

[27] You can view the article titled "Municipality and Environment Denies Rumors Circulating on Social Media About Air Pollution" published in **Al-Sharq** Newspapers on October 9, 2016. Visit the link for more details: https://al-sharq.com.

[28] The article titled "Minister of Environment and Climate Change to QNA: Air Quality in Qatar is 'Excellent'" was published by the Qatar News Agency on October 19, 2022. You can find more details in the article, which was referenced on June 1, 2024.

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measuring devices from Plume Labs unable to provide accurate readings, as they do not differentiate between natural and industrial pollutants.[29]

2.1.2.3. Reading Method of Plume Labs' Air Pollution App

Plume Labs has successfully simplified the reading of air pollution levels across various cities worldwide. The application, which can be installed on smartphones, makes it easy to understand pollution levels without the need for a specific language. It uses a color-coded system comprising four colors to indicate pollution levels and permissible limits:

2- Green (0 to 20 AQI): In this range, the app indicates that pollution levels are ideal, signaling that the environment is perfect for engaging in physical activities such as exercise, outdoor walks, and travel.

3- Yellow (21 to 50 AQI): Here, the app suggests that pollution levels have started to exceed the acceptable natural limits, although they are still considered acceptable. However, it alerts users that these levels surpass the thresholds set by the World Health Organization.

4- Red (51 to 100 AQI): At this stage, the app indicates that pollution levels are high. Users are advised to exercise caution, as the surrounding air may pose a risk to respiratory health. It is recommended that individuals leave the area within 24 hours.

5- Purple: This color indicates a severe rise in pollution levels, urging individuals to evacuate the area immediately due to significant health risks for themselves and others present.[30]

This intuitive system allows users to quickly assess air quality and take appropriate action based on the color displayed on their device.

2.1.2.4. Simplification of the Reading Method in Plume Labs' App

What distinguishes Plume Labs' electronic application in the environmental field is its diverse media content, which includes readable information, images, and videos. The app is designed and updated to ensure ease of use for individuals of all ages, even for those who may not be familiar with technology. Users can simply refer to the colors displayed in the app, which indicate pollution levels from lowest to highest, enabling them to access technical information that was previously only interpretable by specialized engineers in air pollution measurement.

As a result, understanding pollution levels is no longer a technical challenge; instead, app users worldwide can access real-time pollution data throughout the day. Plume Labs has gone beyond merely creating the electronic app for air quality information; they have also integrated it with a portable personal sensor that is available for purchase by both individuals and businesses. This combination enhances user engagement and provides a practical tool for monitoring air quality, making it accessible to a wider audience.

2.2. Technical Controls Surrounding the Accuracy of the Device Manufactured for Collecting Air Pollution Data

After Plume Labs developed an application that can be downloaded on smartphones, the company turned to manufacturing a personal sensor for measuring air pollution, which can be purchased by interested individuals. The device is priced at €99, a reasonable amount that seems accessible to most segments of society.

However, a legal question arises regarding the accuracy of the manufactured device and the precision of the data it provides about air quality, as well as the role of device owners in enhancing the application and supplying it with information about pollution levels worldwide.

[29] See https://plumelabs.com/fr/air/

[30] The media activity of environmental protection associations plays an important role in the issue of air pollution. It can have a positive impact when it highlights the dangers of pollution and presents facts about its effects with numbers that raise public awareness. However, it can also have a negative impact when these facts are exaggerated or not well-researched. For example, the French Environmental Protection Association states that air pollution causes the death of half a million people in Europe alone, ranking it after alcohol and tobacco as a cause of death. The question arises: are these figures accurate? For more details, see L'ESSENTIEL - Pollution de l'air : les mesures à prendre, France Nature Environnement .https://fne.asso.fr

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2.2.1. Manufacturing a Portable Sensor Device

After gathering information and data on air pollution in various countries around the world, Plume Labs resorted to manufacturing a personal pollution measurement device for sale to individuals who monitor air quality for activities like exercising and traveling, both locally and internationally. The company's goal in selling personal sensor devices and linking them to the application is to have them accompany the user throughout the day, anywhere in the world.

However, despite the manufacturers at Plume Labs striving to make the device sensitive to extreme levels of air pollution, it has not proven to be significantly beneficial. The device faces challenges that high-efficiency fixed measurement instruments encounter and cannot overcome.[31] The device relies on other applications such as GPS and smartphone Bluetooth, and it also depends on an internet connection, meaning it cannot transmit data when signal loss occurs. Furthermore, the device cannot measure pollution at every moment; if the user moves quickly from one area to another—such as riding a bicycle, driving a car, or traveling by train—the device's effectiveness in reading the rapidly passed area diminishes.

While Plume Labs has not denied these flaws, or at least we can call them shortcomings in the device's accuracy, the inevitable conclusion is that the information will not be definitively reliable. This implies the device may possess hidden defects leading to potential civil liability for the company or fail to meet specified standards, holding the company accountable.

Moreover, from reviewing the information on the company's website, it is clear that they have not acknowledged a varying margin of error, meaning there is no absolute accuracy in the device. The device detects pollution through particulates without distinguishing between an area with natural dust, like that from a sandstorm, and another area with industrial smoke and dust. The air pollution in the first area can change rapidly with the end of a sandstorm, a lull in the winds, or rainfall. In contrast, in industrial areas, pollution remains longer due to the continuous presence of the pollution source,[32] indicating an uninterrupted persistence of pollutants.[33]

2.2.2. Direct Linking of Devices to the Application

Despite Plume Labs' efforts to simplify the reading of pollution levels, it seems that the scientific value of the information provided is not precise. All devices purchased by consumers are linked to the application, and device owners can download the application on their smartphones. The application, as previously mentioned, includes the foundations and guidelines for explaining to users how to interpret the colors that indicate air pollution levels. The device has been designed to be user-friendly, allowing owners to operate it easily without prior knowledge of pollution measurement techniques. This means we have a technological device that simplifies a process typically requiring specialists to interpret, making it accessible even to those with limited knowledge.

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[31] Three types of measurement tools are used to assess air pollution: continuous measurements, indicative measurements, and measurement campaigns. Continuous measurements are conducted by monitoring stations that sample the air and then transfer it to an analyzer. Pollutants are analyzed using physicochemical techniques that measure the chemical properties of gases to determine their quantity in the atmosphere. Indicative measurements or measurement campaigns are intermittent measurements. Air samples are taken first and then sent to a specialized analysis laboratory that studies the concentration of pollutants. Furthermore, air pollution measurements have become clearer thanks to the definition of air quality indicators, the most commonly used of which is the ATMO index. For more information, visit: https://www.franceenvironnement.com

[32] See Afifa, Arshad K, Hussain N, Ashraf MH, Saleem MZ. Air pollution and climate change as grand challenges to sustainability. Sci Total Environ. 2024 Jun 10;928:172370. doi: 10.1016/j.scitotenv.2024.172370. Epub 2024 Apr 10. PMID: 38604367.

[33] The company's idea began with an intriguing psychological factor that appeals to large segments of society, particularly as it offers its product related to the application and air pollution sensor based on two main factors: the first is raising awareness among a broad audience about air quality, and the second is the company's ability to present information in a way that is easy for the public to read. The company was founded in 2014 by two individuals and received support from the Lisa laboratory (the joint laboratory for atmospheric systems) of the French National Center for Scientific Research (CNRS), along with the Agoranov incubator. It was subsequently funded by doctor and political activist Laurent Alexandre, in addition to support from the European Commission. After five years, the company announced its success, having begun selling sensors when the application started providing information about 400 cities around the world. See CHARLOTTE DE SAINTIGNON, les echos entrepreneurs. Le 21/11/2016. ,Plume Labs, la start-up qui mesure la pollution de l'air, lève 4 millions d'euros https://business.lesechos.fr/entrepreneurs/idees-de-business/0211500459464-plume-labs-capte-la-pollution-302307.php And see an article about Laurent Alexandre's support for the project: Laurent alexandre apporte 2 m€ à plume labs, les Echoc capital finance, 16 decembre 2016. https://capitalfinance.lesechos.fr/deals/capital-risque/laurent-alexandre-apporte-2-m-a-plume-labs-114120.

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This raises the question of whether it is wise to place such trust in a small sensor device that has significant implications. As indicated by its manufacturers, the device measures pollution in public streets, secondary roads, forests, and even within buildings and closed rooms, as well as in tunnels and subways.[34] However, this simplification through the manufacturing of a device and the ease of reading air pollution levels does not guarantee high accuracy in the information provided without any margin for error.

3. Civil Liability for the Inaccuracy of Plume Labs' Application

Although the aim of Plume Labs in creating an electronic application for measuring air pollution levels around the world is commendable, the legal aspects raise numerous issues centered around two main concerns: first, the accuracy of the information provided; and second, the potential confusion caused to official authorities in various countries, which could harm these nations by disseminating unclear information about air pollution that may not reflect reality or is at least exaggerated. This could lead to legal action against the company for both material and moral damages, serving as a deterrent for others.

Furthermore, does this not constitute a compounded error that misleads the public and negatively impacts countries by classifying them as highly polluted, thereby discouraging travel and depriving them of investors, tourists, and other individuals?

3.1. Plume Labs' Obligation to Provide Accurate Data

The current research has previously emphasized that Plume Labs has not denied that the information it provides is uncertain; rather, it is estimated. This raises a debate centered around two main areas: the first one concerns the initial data that the company relied upon in creating the electronic application. It is likely that the company sourced information about air pollution from global health organizations without consulting official institutions in each country. The second one relates to the reliance on the sensors used by each consumer to feed the application with information about air pollution in the city where the device owner is located. Consequently, the application gradually accumulates data about air pollution in various parts of the world, at least in the countries where the users of the sensors are present.[35]

3.1.1. Plume Labs' Obligation to Use Scientific Methods for Measuring Air Quality

Plume Labs acknowledges that the manufactured device is unable to distinguish between natural and artificial sources of pollution. In fact, the device does not differentiate between water droplets in a humid environment and nitrogen dioxide. This means that humidity caused by water vapor in the air will be measured as pollution, regardless of whether it is in an enclosed or open space. This raises a critical question: given the company's admission that humidity increases during the summer in Qatar, how can the device provide an accurate reading of air pollution?

Conversely, the company also acknowledges that the device is not always capable of detecting all fine particles, especially very small ones like those from diesel.[36] To emphasize the quality and utility of the device, Plume Labs focuses on the variance between readings rather than the actual measurement values. This approach is, of course, subject to criticism. The crucial issue is not just the value of these measurements, but rather their variability and the monitoring of changes. Scientifically, this seems

[34] Initially, the application provided information and data about air pollution obtained from various sources and made it available to the public. It became clear on its website that it displayed information about pollution levels that exceeded the limits set by the World Health Organization. The personal devices sold to consumers then contributed to gathering information about air quality, which was displayed in the app. Once connected to the app, this information became publicly available to all app users about the area where the user's personal sensor measured pollution.

[35] Although Plume Labs emphasizes that the results are not entirely certain, it considers that the data it provides helps researchers, governments, and non-governmental organizations monitor air quality, see Emma Murphy, Climate change undercuts air quality gains made during lockdown, 3 mai 2021. https://www.mobihealthnews.com/news/climate-change-undercuts-air-quality-gains-made-during-lockdown

[36] Plume Labs questions the accuracy of air quality maps for each street, responding that the margin of error is very small, see https://plumelabs.zendesk.com/hc/en-us/articles/360010752560-How-accurate-are-the-Street-by-Street-Air-Quality-maps

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flawed, as the company's admission of the device's inability to differentiate between natural and artificial sources undermines its argument for examining the difference between readings.

For instance, if the device measures high pollution due to humidity and then the measurement decreases at night when humidity levels drop, does this imply a definitive conclusion that air pollution increases during the day and decreases at night?

3.1.2. The Partnership Between AccuWeather and Plume Labs in Information Exchange

AccuWeather, a company specializing in meteorology, has supported Plume Labs to enhance the information provided to app users regarding pollution levels in cities around the world. This partnership enables users to make informed decisions based on the data available to them, shaping their opinions and choices about the places they intend to visit.

There is a growing public concern about air quality, especially in light of reports from the World Health Organization (WHO) warning of an increase in global mortality rates due to air pollution. Various respiratory diseases, including chronic obstructive pulmonary disease, lung cancer, and acute respiratory infections in children, have become more prevalent.[37] In response to these pollution concerns, AccuWeather has coordinated efforts with Plume Labs through investment and partnership aimed at protecting individuals from air pollution.

Stephen R. Smith, the president of AccuWeather, emphasized that the high accuracy of AccuWeather's forecasts combined with the air quality data provided by Plume Labs has created a partnership focused on raising public awareness about the dangers of air pollution. This collaboration aims to reach a broader audience within society, enhancing the options available to users and giving them greater control over their health.

3.1.3. Addressing Air Quality Issues Based on Solid Foundations

The right to breathe clean air is a fundamental human right,[38] necessitating assistance for individuals to track, understand, and take action to reduce their exposure to air pollution.[39] By collecting data from the most reliable sources of air quality information worldwide, Plume Labs creates global maps and forecasts of air quality levels, thereby raising awareness about the dangers of air pollution. However, the company's role is limited to providing detection tools without offering any solutions; it simply displays these maps in its application as warning signs.

Romain Lacombe, the founder and CEO of Plume Labs, stated that the purpose behind establishing the company is to make information about what we breathe accessible to everyone by using the most innovative technologies to predict air quality. The role of the company is not fundamentally different from that of AccuWeather, which provides daily weather reports. Consequently, AccuWeather has expanded its offerings to include air quality information for each region where it reports on weather conditions.[40]

3.2. Civil Liability of Plume Labs for Breach of Obligations

The rapid advancement of information networks has facilitated access to information across various activities, including environmental data and air pollution statistics. While this reflects positive aspects, there are negative implications stemming from the inaccuracy of the information available to users, leading to confusion and misinformation. In either case, this could result in personal and collective decision-making based on flawed data. The question arises: can an electronic publisher be sued for inaccurate and misleading content?

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[37] 9 out of 10 people worldwide breathe polluted air, 2 May 2018. https://www.emro.who.int/media/news/9-out-of-10-people-worldwide-breathe-polluted-air.html

[38] Clean Air is a Human Right - UN Special Rapporteur, 4 June 2019 https://unfccc.int/news/clean-air-is-a-human-right-un-special-rapporteur?gad_source=1&gclid=Cj0KCQjwsPCyBhD4ARIsAPaaRf1UQleoFN0I28eCAdTpHvCthAuuKDwAYDmT7BdVmkjbF64t4aKSc5waAsLCEALw_wcB

[39] Face à la pollution de l'air qui tue une personne toutes les 5 secondes, l'ONU appelle à agi, 3 juin 2019 Santé. https://news.un.org/fr/

[40] The fundamental question lies in determining the role of the law in combating air pollution and its role in monitoring these companies to ensure the provision of accurate data on air pollution. For more, see Yamineva Y, Romppanen S. Is law failing to address air pollution? Reflections on international and EU developments. Rev Eur Comp Int Environ Law. 2017 Nov;26(3):189-200. doi: 10.1111/reel.12223. Epub 2017 Nov 28. PMID: 29263789; PMCID: PMC5726376.

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3.2.1. Lack of Guarantee from Plume Labs Regarding Device Reading Errors

Upon reviewing the terms of the agreement published between Plume Labs and its users, it becomes evident that the company does not guarantee the accuracy of the data. Furthermore, it exempts itself from civil liability in cases where the application service is interrupted for maintenance purposes or due to issues related to network malfunctions. In such cases, where conditions of force majeure apply, the company will be exempt from civil liability towards the user.[41]

However, the company's commitment to publishing information about air pollution in cities worldwide raises a debate about the nature of its obligations and the liabilities it incurs. Through the terms of the agreement, the company considers its obligation to be one of due diligence. Yet, the manner in which it presents the subject of air pollution suggests that it claims a leading role, making users trust the data on air quality and regarding it as the definitive source, especially if it contradicts data provided by governmental entities.

In our view, the civil liability of the company for the data it provides to the public is established. The reason is that the updating of air quality information fundamentally relies on every user of the sensor device. The device owned by the user transmits data directly to the application, allowing it to update information about air pollution in the city where that user has been with the sensor device. This raises questions about the accuracy of the data, as the user might be located near a construction site generating dust or close to a factory emitting smoke and waste, which cannot accurately represent the air quality in that city. Moreover, a user might intentionally place the device in a highly polluted area to confuse the application, which cannot verify the accuracy of the information.

This confusion leads to questions about the company's civil liability, as it is ultimately responsible for the accuracy of the data, regardless of how it was obtained.[42]

In summary, there is no way for the company to exempt itself from civil liability unless it explicitly states that the information contained in the application is for reference only, that the pollution levels are unverified, and that the data from governmental agencies in this regard is the most accurate.

3.2.2. Lack of Guarantee from Plume Labs Regarding Device Accuracy

The company did not guarantee the accuracy of the readings; instead, it presented the application and device as tools that provide estimative data. This is especially true given that the conditions surrounding the device's usage may not allow for real measurements. As previously mentioned, quickly moving from one location to another means that continuous measurements will not be captured. Nonetheless, the company asserts that these are precisely the areas it prioritizes for improvement and emphasizes the need to establish a partnership with the user community.

In our opinion, this partnership is contentious because Plume Labs aims to protect itself legally by positioning the public as a partner in building the information, rather than a passive recipient of data that the company has obtained and is solely responsible for in terms of accuracy and civil liability.

Therefore, under the manufacturer's obligation to guarantee the product according to the 1998 law, and given that Plume Labs holds a patent, its obligation is to achieve a certain level of accuracy with the device under French civil law.[43] By selling the device, it enters into a contractual relationship with the purchaser, committing to provide a highly accurate device and accurate information about air pollution. If it is found that the device is defective,[44] the purchaser can sue the company for providing a defective product. As for the users of the application who rely on the information provided, they have the right to

[41] See article 14 (2) that provides " 14.2 : Plume Labs does not guarantee to the Users that the Application and the Services, which are subject to constant research to improve their performance and progress, will be totally free of errors, faults or defects. In any event, Plume Labs reserves the right to interrupt access to the Application momentarily for maintenance purposes. In the same way, Plume Labs shall not be held liable if the Application is ever momentarily difficult (or impossible) to access, the causes of these circumstances being outside Plume Labs' control, force majeure, or due to any disruption in the telecommunications network."

[42] Plume Labs acknowledges that there is a contractual relationship between the company and the users of the application. "Finalité 1 : Gérer votre accès à nos applications et votre utilisation de nos services Bases légales Exécution de mesures précontractuelles prises à votre demande » see https://plumelabs.com/fr/privacy-policy/.et exécution du contrat que vous avez souscrit avec Nous

[43] La loi du 19 mai 1998 sur la responsabilité du fait des produits défectueux .

[44] Marie-Pierre Camproux-Duffrène, La loi du 19 mai 1998 sur la responsabilité du fait des produits défectueux et la protection de l'environnement, Revue juridique de l'Environnement Année 1999 2 pp. 198-199.

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sue the company for breaching its obligation by disseminating incorrect information. Its obligations towards its audience—both device purchasers and app installers—constitute contractual obligations that trigger contractual liability.[45]

Moreover, as the device and application specialize in measuring air pollution across cities worldwide, the company is thus engaged in precise technical matters that fall under the purview of governmental institutions. Consequently, this imposes complex obligations on the company to provide accurate information according to scientific standards. The information provided by the application must not contradict that from government-installed devices, which are high-quality instruments with obligations to their users to deliver information without misrepresentation, ensuring high accuracy in measuring air quality at specific times and places.[46]

4. Conclusion

Air pollution is measured using technical devices to monitor air quality, prepared by the Qatari Ministry of Environment and Climate Change, which is the official source of information on air pollution. Therefore, the existence of electronic applications available for smartphones, adopted by foreign companies like Plume Labs, plays both a positive and negative role. When these applications rely on the official source for measuring air pollution—the Qatari Ministry of Municipality and Environment—it assists individuals in knowing the areas of pollution where physical activity is not recommended. Conversely, if the information in the application about air pollution is unregulated and confusing, or at least speculative, it leads to harming an official institution and creates confusion in its operations, raising significant questions about the purpose of these applications. While Plume Labs appears profit-driven, its efforts to promote community engagement and public awareness in air quality measurement must be grounded in transparency.

5. Recommendations

1. Air pollution studies cannot be conducted in a generalized manner; first, it is necessary to diagnose whether the pollution is natural, unnatural, or mixed, influenced by various elements. Natural pollution can be reduced by establishing a legal framework that contributes to reducing desertification by attempting to find sources of freshwater and establishing scientific committees to study all proposals submitted to the Ministry of Municipality and Environment, in addition to preserving natural resources. As for combating unnatural pollution, it is essential to create a comprehensive legal system that addresses unnatural pollution by prohibiting the import of harmful materials to the environment and health and finding environmentally friendly alternatives.
2. The study can only be completed by establishing national scientific and legal research centers capable of diagnosing the sources of pollution, its causes, and methods of treatment in the short and long term. These centers contribute to setting various goals, especially when signing international or regional agreements, determining the legal status of each party. The party scientifically identified as the cause of pollution must bear civil responsibility before signing an agreement equal to the other parties.
3. Benefit from scientific studies in various global and regional research centers and how they address natural and unnatural pollution problems in different countries, with the requirement to present them to national research centers to assess their compatibility with the climatic nature of Qatar.

[45] Since Plume Labs is a French company, it will be held liable under Article 1245 of the French Civil Code for defective products. Any damage caused by the device will obligate the company to provide compensation, whether or not it has a contractual obligation to the affected party. See Article 1245 du Code civil Le producteur est responsable du dommage causé par un défaut de son produit, qu'il soit ou non lié par un contrat avec la victime.

[46] Marion Bary et Marie-Hélène Hubert, « Instruments juridiques et économiques de régulation de la pollution de l'air et de l'atmosphère », *Cahiers Droit, Sciences & Technologies*, 6 | 2016, 123-143.

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4. Greater attention should be paid to electronic applications providing information about air pollution that may conflict with information from official sources, which may require warning them as they harm official institutions.
5. Establish a national electronic application for smartphones that provides accurate information about air pollution, to prevent the existence of electronic applications that confuse the real information about air pollution.

Copyright:

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