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The Clean World of Dirty Work: Actors, Technology, Social Relations

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Abstract

This paper explores the importance of technology in the work of cleaning agents and implicitly of companies specialized in offering professional cleaning services. Understanding how dirt is part of society and how it is integrated into the concerns of major industries in the field is useful. Approaching dirt as unpleasant and its removal as denigrating are aspects deeply rooted in the cultural meanings of this work. The practices and ways in which cleaning is done with the help of technology are what make the work with dirt more honorable and less degrading. Dirty work seen through Everett Hughes' concept of the "moral division of labor" can be understood as the existence of hierarchical distinctions within the profession of cleaning workers. Who has access to the use of revolutionary equipment? Are there limitations on their use? What kind of limitations? Treating technology as part of the cleaning process seems to be not immune to fear from users and compromises from companies. However, in some situations, it seems that the digitization of the cleaning process and the replacement of humans with robots will be just a happy and somewhat confusing dream that creates a rift between the dirty world of dirty work and the clean world of dirty work.

Keywords

Work, Work with Dirt, Digitalization of Work, Technology, Innovation

1. Introduction

From time to time, lying in bed, we may have thought about our ancestors, what they worked with and especially with what. All those tools used by them were once innovative, the range of items that we are now familiar with and are at our disposal have also been part of the process of adapting their users.

As technology and work digitalization gain momentum in all fields, it seems

that even the cleaning industry has not been left untouched. Machinery that is not readily available to the public is revolutionizing the cleaning industry and bringing the work in this field to a much higher level than the stereotypes and prejudices that surround it. Equipment that remains only a dream of Amsterdam for those who do not possess the economic resources and the ability to use them; they are more like machines that make you play in the big leagues. So, with such practical importance and social reverberation, how do robots, utensils, and implicit facilities often go unnoticed by those involved in their use?

In many other fields of activity, the cleaning industry also has several components that tend to be organized, managed, and manipulated. It is a complex activity that involves economic, social, and relational processes, technology-related issues, gender relations, power relations, and so on. This type of work is generally carried out by people with low qualifications, whether we are referring to domestic cleaning (cleaning ladies, housewives) or institutional cleaning (which is carried out by companies in the field). Although the cleaning industry is a cosmopolitan one, I will address the issue of work in the cleaning industry within specialized companies that provide professional cleaning services.

Ensuring a clean, sanitized, and healthy work environment is just one of the elements that cleaning services aim to fulfill. The main and, for now, irreplaceable resource is people. Thus, this is a story about the people in the cleaning industry, about how "they simply live and have daily experiences with profound gender connotations and implications" (Grunberg et al., 2006: p. 9). It is a story about work and how cleaning is represented as a historical process, a process that involves physical labor but also a process that involves ideologies that can generate discussions related to technology and labor relations, digitalization, and social stratification.

In literature, "A profession, a golden bracelet" is a subject of controversy in the public space. We have professions, we value them, we consider having a job to be a basic need. But what happens when a simple press of a button makes your profession disappear? For example, in the mid-nineteenth century, when electricity was invented, darkness fell over the profession of lamp lighter. Cleaning lamps and lighting them daily suddenly became meaningless and was no longer done. Will the same thing happen to the cleaning profession? We have no certainty in this regard, but what we know for sure is that it has taken various forms over time.

The purpose of the study is to observe how technology is positioned in the work of cleaning agents and especially how it is presented in their everyday lives. Starting from the existence of the two worlds, the dirty world of dirty work and the clean world of dirty work; I aim to highlight the implications of new technologies in cleaning activities. The objective of the research is to present, in the following, a part of the clean world of dirty work, what it faces, and what are the main directions when these technologies need to be implemented in the work with dirt.

2. Short History of Cleaning as a Social Activity

Before analyzing modern cleaning, that of the 21st century, I find it appropriate to present among the first important records describing cleaning activity in its rudimentary state. Thus, the roots of cleaning date back to 2800 BC, when ancient Babylonians began to produce soap; recipients with the inscription "boiled fat with ash" have been found. Other evidence dating back to 1500 BC shows that the Egyptians used vegetable and animal oil to form soap-like substances (Trueman, 2015). What we know today as a cleaning tool, the broom, was in the past a bundle of tied branches attached to a stick used to sweep ash and embers around the fire. Moreover, although the first reference to witches flying on brooms was in 1453, the production of brooms began around 1797 by a farmer who had the idea of making his wife a broom to clean the house (Lowder, 2012). Chemical cleaning, accidentally invented in 1849 by spilling turpentine on a tablecloth, revolutionized the way cleaning was done. Later, in 1866, the company Pullars of Perth began to offer home cleaning services with an improved formula of the solution used 17 years earlier (De Botton, 2019: p. 42). Cleaning with the help of ultrasound is now considered conventional for industry, the scientific field, and medical laboratories (Mason, 2016: p. 1). Its origins date back to the 1950s, so how did we go from inventing brooms to cleaning with ultrasound to robots in the 2000s?

Regardless of the tools used, the solutions or methods of application, cleaning is widespread and present everywhere, being an important part of any society and culture. Using a relevant example that refers to the household action of vacuuming, Cowan (1983: pp. 4-5) shows that the appearance of a tool that facilitates this activity can influence its frequency, as well as the number of people involved. Specifically, if before the appearance of the vacuum cleaner, several people put more effort into cleaning carpets and this happened less frequently, after this tool reached people's homes, this activity became more accessible in terms of both frequency and involvement of other people. So, what social impact can robots that we will use in the industrial environment have?

As vacuum cleaners entered people's homes, cleaning in environments such as industry is done with ultrasound. Then, while the importance of disinfection is emphasized in homes, in industry the emphasis is on the connection between physics and chemistry as part of the cleaning process. Now, we are starting to clean without solutions, just with the help of water and physics (friction force, weight, and material used). All these aspects of improving the way cleaning is done are strongly related, I believe, to the importance given to the environment and attention to climate change, starting from the 1950s when ultrasonic cleaning technology appeared (Mason, 2016). These developments in the field of cleaning and hygiene are heading in an as-yet unknown direction, but one that is extremely promising in terms of social importance.

3. Methodological Considerations

As we have seen, cleaning is just a simple, routine activity that does not require a

high level of qualification. Each individual has their own understanding of what it means. What is still unstudied in the case of cleaning companies is the influence of new cleaning technologies and their impact on social relationships between actors. For these reasons, I am researching whether technology can be implemented, adapted, and how it can reconfigure social relationships. Presented ethnographically, participation in a cleaning fair, Interclean Amsterdam, offers me an overview of both innovations in the field of cleaning and the social relationships that form. Such fairs offer you the opportunity to see how, paradoxically, innovation manages to make its way into the cleaning sphere. How can the use of new technologies make sense for cleaning agents when sweeping and mopping have been doing a good job for a very long time? One of the main purposes of these fairs is to inspire us not to limit our idea of work in the cleaning field to the same classic solutions that make the activity more difficult, more expensive, and much more denigrating. Fairs such as those organized by Interclean offer a wide range of tools, machinery, detergents, that facilitate the achievement of the goal, creating a clean and healthy working environment.

Innovations, new products, and new services must meet an essential criterion, to be assimilated by society and, especially, to meet the major changes in societal norms, values, and expectations. The unity of purpose of these organized fairs is clearly illustrated when participating in such events and when interacting with representatives of suppliers of various materials, equipment, and detergents. From an objective perspective, in the ethnography done during participation in Interclean Amsterdam and the Interclean China Innovations Sessions webinar, I followed how all these new technologies are presented and made available to users, cleaning agents.

Interclean Amsterdam, held from May 10-13, 2022, aimed to bring together professionals from the cleaning and hygiene industry. This 28th edition brought together around 25,900 professionals (RAI Amsterdam, 2022). On the other hand, the goal of Interclean China Innovations Sessions was to bring the main innovations from the categories of Robotics & AI (October 25, 2022), Machines (November 8, 2022), and Equipment (November 17, 2022). While in the case of the first event we discussed innovations and technologies from various countries, in this case the presented discoveries are from the cleaning industry in China.

The actors involved in innovation engage in a set of practices that promote and shape society's norms and expectations (Purtik & Arenas, 2017: p. 1). Because the habits and routines of users are extremely important to consider when referring to innovation, we considered it necessary to analyze these types of events from this perspective. Those in the world of clean work of dirty work meet frequently, discuss, and innovate together. It's wonderful! But do we know who controls them and especially how? The work of these innovators and their supporters has an undeniable positive impact, but from time to time, it would be good to see how great the distance is between the clean world of dirty work and

the dirty world of dirty work.

The intensification of global industrialization, demographic explosion, the development of new products, and high production, according to Severo et al. (2017), have contributed to economic development, but have also resulted in environmental degradation and ecosystem damage. In this context, innovations in the cleaning services sector consider the development of ecologism, as an integrated part of the consumption strategy and the marketing of new products. Trends are not embraced willingly, but because there are constraints from institutions that regulate and verify established standards, as well as government programs that are aware of climate change and growing emissions. We can consider that the need for a cleaning company may have arisen when legislation imposed these cleaning and hygiene standards. Therefore, participation and interest in innovation fairs are necessary as long as you want to position yourself among the first potential collaborators on the targeted customers' list. Is it about the ability to adapt to new trends in the field? Does technology make work easier? Does it make it faster?

4. A Future Experience

Meanwhile, at RAI Amsterdam, every two years since 1967, the largest trade fair in the cleaning and hygiene industry in the world is organized. Interclean Amsterdam is just a niche event, but it leaves the public with a complex perspective on the innovations of cleaning products and solutions. Direct participants will be able to follow the main discoveries in areas such as healthcare, high-pressure cleaning, management and mobility solutions, steam cleaning, sanitary group consumables, window cleaning, machines, equipment, and detergents. This event can be framed in what Purtik & Arenas (2017) call the way a company intends to bring technologies with different innovation characteristics to the market, shaping the informal institutional mode during different phases of the innovation process. Cleaning staff are subjected to the pressure of changing society and new technologies on the one hand, while companies bring innovations to the activity they carry out on the other hand. How do they cope with new trends? Through events such as the Interclean Amsterdam fair, which presents innovations in each edition (**Image 1**). The interaction at the fair makes you understand how difficult it is sometimes to bring technological innovation into activity. Besides the reluctance we face among those who carry out cleaning activities, we also encounter another impediment that comes with the main limitation, the country where we carry out the activity. The innovation presented in such places makes potential customers dream of implementing and/or acquiring new gadgets that could not yet be useful, as there is no infrastructure or suitable environment for their use. How does innovation become practical? For example, in Romania, it would often be difficult to implement. Buildings have small, often crowded spaces, without elevators, which do not allow the use of robots, which are more useful in open spaces.

Image 1. Innovation lab at Interclean Amsterdam 2022.

Social innovation can have several directions, the main ones identified when referring to the cleaning industry are ecological innovation and technological innovation, each of them being subdivided into key categories for the field of interest of the present study. On the one hand, current social problems originate from environmental challenges, thus discussing innovation to reduce the environmental problems we face. On the other hand, current social problems are related to technological progress, which has been in continuous expansion in recent decades. Studies in the field of ecological innovations or "green innovations" such as De Marchi (2012) and Hoffmann (2007) explain that users of various products and services must be convinced that they represent added value both to society and the environment, as well as for themselves (Purtik & Arenas, 2017: p. 3). It is important to mention that this new technology applied in the hygiene industry was born from the minds of producers and not of end-users (Santamaria, 2016: p. 31). When it comes to choosing to use certain environ-

mentally friendly detergents or consumables, they are chosen, in most cases, not due to ethical reasoning. Morality is not a criterion, but rather an obligation reflected by the legal side. Abstracting the purpose, compliance with environmental protection rules and regulations leads to cleaner spaces. According to the United Nations Environment Programme (UNEP), the continuous application of an environmental strategy for the processing of products and services increases overall efficiency, but also reduces risks for people and the environment (Yusup et al., 2015). The implementation of the environmental strategy involves processes, products, and services that manage the use of natural resources, waste reduction, and pollution, all for the safety and health of people. An event (the Great Smog) that took place in London in 1952 led to the establishment of the Clean Air Act in 1956 (Atkinson, 2018: p. 148). However, the starting point in environmental issues is represented by the United Nations Conference on the Human Environment, held in Stockholm in 1972, where environmental pollution problems were highlighted as a global concern that must be treated seriously and with involvement. Following this conference, the United Nations Declaration on the Environment, known as the Stockholm Declaration (Sohn, 1973; Yusup et al., 2015), was drafted. Karakaya et al. (2014) state that understanding the diffusion of eco-innovations is critical because some of them have now reached a state of maturity, but the diffusion rate is slow and the path unclear. Innovations in the ecological field respond to the pressures brought by legislation and global society but require a long period of adoption. When discussing the possible direct proportionality between environmental management and business performance, the results are inconclusive (Zeng et al., 2010: p. 975). Thus, we have no evidence that performance and a high level of cleanliness are implicitly linked to the existence of good management regarding environmental procedures. In response to government regulations, more and more manufacturing companies have adopted cleaner production for environmental protection (Zeng et al., 2010: p. 981). The efforts made, according to Zeng et al. (2010: p. 981), also bring competitive advantages. These come, as mentioned earlier, following a trend, not following a high quality of cleanliness. Another study (Schaltegger & Synnestvedt, 2002: p. 339) presents two perspectives related to environmental performance and economic performance. One perspective is that improved environmental performance causes additional costs for the company, implicitly reducing profitability. Another point of view is that improving environmental performance would induce cost savings and increase sales, thus improving economic performance. Both perspectives are widely debated in the literature, but I will analyze them both, as they appear in the discourse of sellers of such products.

On the other hand, we have technological innovations. I consider these to be in opposition to environmental innovations, as they use raw materials (water and energy), pollute, and waste resources. These resources are considered important by ecologists. In each system, the growth of resource consumption must

be finite, this being the great challenge of modern societies (Schaltegger & Synnestvedt, 2002: pp. 339-340). However, the main difficulty is to synchronize all actors involved to cooperate and integrate systems into day-to-day activities. Robotic technology has existed in industries for a long time, but only recently has it also reached the cleaning equipment industry (Santamaria, 2016: p. 3). There is a trend towards technologizing work by cleaning floors with robots, apparently, according to Santamaria (2016: p. 3). Moreover, the latter predicts that technology will take over all cleaning tasks, ultimately becoming done by robots. "Internet of things" or "object connectivity" is another technology that has entered the hygiene industry and is treated in Santamaria's study (Santamaria, 2016: p. 10). Through this new technology, data can be collected on the frequency of cleaning, disinfection, and sanitization tasks in a space. The advantages of these new technologies in the field are related to improving the quality of services, streamlining cleaning processes, and, above all, improving the business model (Santamaria, 2016: p. 10-11). From a management point of view, it is an advantage because all these new technologies allow greater control by providing information on location, maintenance, battery level, and the need for punctual interventions.

It seems that the extent of the "internet of things", according to (Santamaria, 2016: p. 3), was unimaginable. The main idea came from the customers' need to improve the quality of processes and increase productivity, obviously at a low cost. Not only the extent, but also the speed of technological advancement are to be taken into account. It is estimated that robotic technology, more specifically the "internet of things", will be part of our lives by 2025 due to sustainability in the cleaning industry (Santamaria, 2016: pp. 3-5).

The dual challenge of economic development through the technologization of processes and environmental conservation is currently a concern for developed countries (Ahn & Yoon, 2020: p. 1). The implementation of technologies and the simultaneous promotion of reduced environmental impact is a real challenge in a period of rapid industrial development. Gosens et al. (2015: p. 379) explain the concept of "clean technology", understood as technology that has a reduced impact on the environment, through reduced environmental emissions or reduced use of natural resources. According to Truffer (2012), conventional technologies use the aforementioned resources in providing cleaning solutions or products (Gosens et al., 2015: p. 379). In turn, product developments are 100% aligned with this strategy by providing solutions that produce the least possible impact on the environment, reduced cost, reduced energy and water consumption, and helping communities (Santamaria, 2016: pp. 33-34).

A nuanced perspective on innovations in the cleaning industry is represented by Interclean Amsterdam (**Image 2**). It presents itself in the public space as the global showcase for innovation in the cleaning industry, offering knowledge exchange related to the development of the cleaning industry. In this context, innovative actors are the various companies participating in the fair with new cleaning products. They try to influence and adapt the discourse to the values,

norms, and expectations of the wider audience interested in buying such products, but without necessarily considering the specific needs of the target audience, the cleaning staff. The event is dedicated to the first category of subjects studied for "increasing the joy of daily cleaning operations". The objective of this type of event is to present how "things can be faster, cleaner, more ecological, safer, and better for everyone" (Intercleanshow, 2022).

During May 10-13, 2022, the exhibition presented and promoted innovative solutions and products, hosting new trends in the broad field of cleaning from all corners of the world. According to Linkedin, Interclean Amsterdam 2022 offered us a comprehensive overview of the latest developments in the international cleaning industry and attracted key professionals from the largest fields, such as industrial, commercial, institutional, municipal, hospitality, and educational facilities. To see how Interclean presents itself in context, we watched the teaser in which Robert Stelling, Director of Interclean, invites participation. Thus, Robert's speech specifies what to expect from the event of the year, which will take place in Amsterdam during May 10-13, 2022. The grandeur of the event is reflected in the variety and diversity of exhibitors and visitors from about 160 countries, which, he considers, make it a global event. Furthermore, he announces that over 100 innovations will be exhibited and over 50 sessions on sustainability, reports, and data, as well as digital actions, robotics, and others will be inaugurated (Interclean, 2022).

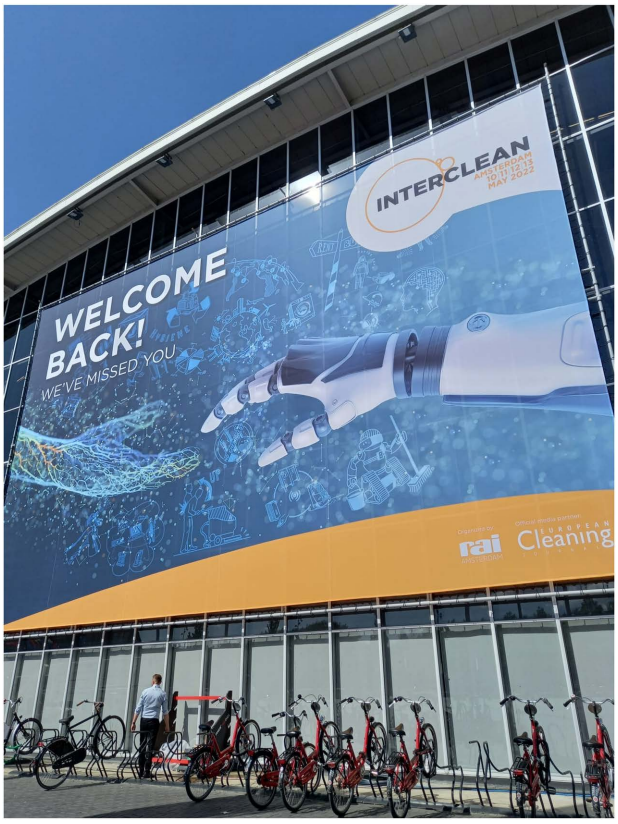

Image 2. Interclean Amsterdam 2022 billboard.

During the four days, demonstrations of equipment usage are performed, and visitors are encouraged to try them out. Additionally, profile discussions are held, potential collaborations are established, and even pilot programs, equipment, and materials are acquired, depending on the company's needs, geographic positioning, and available budgets.

On the first day of the event, the first Interclean Hackathon took place, in which teams made up of facility management students and game designers had 10 hours to create an application. The idea promoted and the purpose of the hackathon is to make workers' lives easier, better, and more fun. Specifically, the perspective of software development is based on objectives related to making blue-collar work "easier, better, or more fun". According to the post on Interclean's official Facebook page, the project initiative started from the idea of a digital skills gap in the professional cleaning industry. The challenge of the day was to develop an application concept for cleaning staff. A dominant discourse in these presentations is centered on simplifying the activities of workers in the cleaning industry. Manfred Zielbauer, Business Development Director of Vileda Professional, hopes that through the hackathon, ideas can be obtained to "support the daily work of workers, which makes their lives easier, while also generating value for business owners". In such situations, such as the one mentioned above, the goal and objective are different. Through the event, Vileda not only contributes to creating an application to support their employees but also aims to indirectly advertise themselves. The same initiative was followed by Tork, which distributed promotional materials to the participants.

Another important area to mention from the perspective of the studied theme is the Innovation Lab area. Here, there is a space where new trends, practices, and techniques are presented, although the central purpose of the Innovation Lab is to present all products nominated for the Amsterdam Innovation Award. Furthermore, in this area, the Robot Arena is a space dedicated to the newest and most innovative robots that demonstrate and showcase their abilities in real-time (**Image 3**). The focus is on the automation of work in the cleaning industry.

Considering the theories regarding technological advancement that help create jobs, they consider that robots help solve the problem of staff shortage and implicitly their retention. From my point of view, there is a discrepancy between expectations, teasers, what is expected, and what happens when dealing with technological advancement. For example, human intervention is necessary for the use, programming, and maintenance of these robots. We face a phenomenon where new jobs are created but with a discrepancy in terms of the need for a higher level of education capital.

Another area of interest at the fair was the disinfection of common spaces and products that are useful in controlling cross-contamination. Throughout the event, several live demonstrations were scheduled in the Healthcare Cleaning Lab area, where cleaning procedures for a patient room and an operating room were exemplified. During these demonstrations, work methods, dress codes,

Image 3. Robots & AI at Interclean Amsterdam 2022.

personal hygiene, and color codes of the cloths and mops used in accordance with EU standards and legislation in the field could be followed.

Throughout the innovation process, especially in the development and commercialization phase, all companies aimed to generate functionality experiences with new technology among future users to dismantle preconceived beliefs, challenge initial fears about the operation of new technology, and provide users with the necessary experience to be accepted in the market (Purtik & Arenas, 2017: p. 21).

5. Conclusion

Working in the cleaning industry is working with dirt, it is a job that has many social, economic, and identity implications. Moreover, Orr (1996: p. 1) considers work a constant in life. Innovations try to reduce dirt even more, helping workers to make their work easier and "cleaner". There is a lot of talk about it, it seems within everyone's reach, but we don't know exactly how it is produced or what this work in the cleaning industry involves. As for work in general, which is considered important in our lives, Orr (1996: p. 1) believes that we rarely talk about what we really do when we do our job. Extrapolating, essential for the current study is how all conventional notions will be replaced by innovative ones, valuing the interests of companies above the benefits they can bring. Evaluating incredibly favorably the direction of innovations in the cleaning industry through what it brings: reduced physical activity, low risk of contamination, and transforming it into a less denigrating job when removing dirt; what is completely missing cannot be ignored. There has been little discussion about what really happens in the cleaning industry, and implicitly about the actors involved in this process. An examination in this direction will better highlight the understanding of both labor relations and the idea of social identity of workers.

Following the experience, these meetings offer the opportunity to learn, try, and keep up with new trends and technological innovations in the cleaning industry. All these innovations are difficult to put into practice, requiring a reorganization of work and space, but not entirely impossible. At the same time, they will be able to be put into practice when they are in line with the needs of the workers themselves, as well as within the budgetary limits imposed by professional cleaning service contracts.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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