

# Cleaning with Services and Spaces: Effects of Seating Materials and Architectural Clutter on Perceived Cleanliness

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## ABSTRACT

**Background and aim** – How do customers determine the cleanliness of their surroundings? Research and practice typically focus on the quality of cleaning services while ignoring the role of other environmental stimuli. The aim of this paper is to explore the effects of seating materials and architectural clutter as determinants of customers' perception of cleanliness.

**Methods / Methodology** – The perception of cleanliness was operationalized using the dimensions: cleaned, fresh, and uncluttered. Effects of seating materials and architectural clutter were examined in three separate experiments in train stations. A field experiment was used to examine the effects of seating materials (N = 544) and a photo experiment evaluated the effects of architectural clutter (N = 220).

**Results** – Smooth seating materials and uncluttered architecture were found to positively influence different dimensions of perceived cleanliness.

**Originality** – This study provides deeper insight into the concept of perceived cleanliness and related dimensions by demonstrating that perceived cleanliness may be influenced by other determinants than cleaning quality only.

**Practical or social implications** – The results may allow facility managers to improve decision making. Instead of solely increasing cleaning frequencies to improve customers' perception of cleanliness, facility managers may decide to invest in replacing or refurbishing seating materials and/or uncluttering architecture.

**Type of paper** – Research paper.

## KEYWORDS

Architectural clutter, cleaning, facility management, perceived cleanliness, seating materials, trains, train stations.

## INTRODUCTION

As one of the key topics in facility management, cleanliness research grew over the last decade. Whereas most of this research typically focusses on the organizational and financial side of cleanliness, we are interested in the customer perspective on cleanliness. More specifically, we will tap into how customers perceive cleanliness and how it may be influenced by properties of services and spaces designs. Customers' perception of cleanliness is determined by the total (holistic) configuration of services and spaces, including cleaning quality (e.g., dust, stains). Although it is without much doubt that customers use environmental stimuli to make sense of service environments, it remains unclear how this works for perceived cleanliness. A systematic exploration and evaluation of how services and spaces influence perceived cleanliness seems appropriate to further the professional and academic field of cleanliness. In this context, we have set up experiments that help unveiling the relationship between services, spaces, and customer perception of cleanliness. The results of these experiments are preliminary and part of a

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larger research project. More extensive discussion of related results will soon be published.

## LITERATURE STUDY

### Dimensions of perceived cleanliness

What is perceived cleanliness? Available definitions and operationalizations mainly focus on how customers perceive the cleanliness of specific interior elements (i.e., windows, bathroom) while ignoring other dimensions, including the aesthetic quality of a service environment (Barber & Scarcelli, 2010). Also, the existing measurement instruments are predominantly intended for specific settings, such as restaurants and hotels (Barber & Scarcelli, 2010; Lockyer, 2003), which complicates generalisability to other service settings. Recently, this void was filled by the introduction of the cleanliness perceptions scale (CPS), this instrument offers a more holistic take on perceived cleanliness by distinguishing three dimensions: cleaned, fresh, and uncluttered (Vos, Galetzka, Mobach, van Hagen, & Pruyn, 2019a). The (1) cleaned dimension focusses on determinants related to the cleaning process (e.g., cleaning quality, visibility cleaning staff), the (2) fresh dimension on the smell of an environment (e.g., pleasant, unpleasant, related to cleanliness or not), and the (3) uncluttered dimension focusses on the architectural clutter in an environment (i.e., organisation, coherence of architectural design). In our two experiments, we measured perceived cleanliness using the CPS.

### Determinants of perceived cleanliness

Since knowledge on determinants of perceived cleanliness is scattered and dominantly accumulated in practice, we used a systematic literature review (Vos, Galetzka, Mobach, van Hagen, Pruyn, 2018a) and a qualitative study (Vos, Galetzka, Mobach, van Hagen, & Pruyn, 2018b) performed in the facilities management industry to select determinants for our experimental studies. Inspired by this previous research, determinants were categorized using Bitner's (1992) environmental dimensions (i.e., ambient conditions, space/function, and signs, symbols, & artefacts). As we wanted to further literature on environmental dimensions of perceived cleanliness, the focus of the study was on the space/function dimension. As such, the effects of seating materials (i.e., upholstery) and architectural clutter were tested in two separated experiments.

#### *Seating materials*

The tactile and visual experience of materials (e.g., dull vs. shiny, cloth vs. leather) has been associated with perceived cleanliness. For instance, researchers demonstrated that people sitting at a table with a shiny (vs. dull) table top had more positive perceptions of cleanliness and showed more cleaning behaviour (Broeders, Lakens, Midden, & Ham, 2011). In an explorative study, scholars found that rail passengers generally prefer smooth materials, such as leather and vinyl over less smooth materials, such as cloth, due to cleanliness concerns (Pepper, Spitz, & Adler, 2003). We will further test the idea that smooth materials may be used to positively influence perceived cleanliness.

#### *Architectural clutter*

Clutteredness and cleanliness may be approached from a non-aesthetic and aesthetic perspective (Leddy, 1995). The non-aesthetic perspective refers to the physical properties of a cleaned or uncluttered environment; cleaning (by using a cleaning cloth) or uncluttering a service environment (by restructuring objects such as document or clothing) may reveal and clarify the underlying objects or structures. Illustrated by metaphors, such as having clean lines, the concepts of cleanliness and clutteredness are used as aesthetic qualities in design. In this study, we tested the idea that the degree of clutteredness of an environment influences peoples' perception of cleanliness. The concept of clutteredness was defined by the number of objects present, variation between objects (e.g., colour, form), and their coherence (Olivia, Mack, Shreshta, & Peeper, 2004; Orth & Wirtz, 2014).

## METHOD

The effects of seating materials and architectural clutter on perceived cleanliness were tested in two separate experiments in the context of public transport.

### Seating materials

Effects of seating materials were evaluated in a field experiment. A total of 544 customers of a Dutch

railway company (56.1% female,  $M_{age} = 33.86$ ,  $SD_{age} = 17.01$ ) participated in this experiment. Participants were travelling in a train with either smooth (i.e., vinyl,  $n = 283$ ) or non-smooth (i.e., cloth,  $n = 261$ ) seating materials (Appendix 1, Figures 1-2). Except for the seating materials, the trains, train trajectories, and cleaning program of the train were identical. Seated passengers were invited to fill out a questionnaire that contained items related to the cleaned, fresh, and uncluttered dimensions of perceived cleanliness measured on a 10-point Likert scale.

### Architectural clutter

Effects of clutteredness were evaluated in an online photo experiment. A total of 220 members of an online customer panel of a Dutch railway company (female = 41.9%,  $M_{age} = 59.69$ ,  $SD_{age} = 22.46$ ) evaluated three photos of a waiting room at a train platform that only differed with respect to their architectural clutteredness, ranging from uncluttered to cluttered (Appendix 1, Figures 3-5). Participants were randomly assigned to one of the three photos (Figures 3-5) and instructed to evaluate the cleaned, fresh (i.e., I think this station smells fresh), and uncluttered dimensions of perceived cleanliness using a 7-point Likert scale.

## RESULTS

### Seating materials

The results of our seating materials experiment show that smooth seating materials positively influence the cleaned ( $F[1, 533] = 44.41$ ,  $p < .001$ ) and uncluttered ( $F[1, 522] = 13.45$ ,  $p < .001$ ) dimensions of perceived cleanliness, no meaningful differences were found for the fresh dimension ( $F[1, 523] = 1.02$ ,  $p = .18$ ). Train compartments with smooth seating materials were perceived as more cleaned ( $M = 7.17$ ,  $SD = 1.20$ ) and uncluttered ( $M = 7.52$ ,  $SD = 1.24$ ) compared to compartments with the non-smooth seating materials ( $M = 6.31$ ,  $SD = 1.74$ ;  $M = 7.08$ ,  $SD = 1.45$ ).

### Architectural clutter

The results of this experiment only showed effects for architectural clutter on the uncluttered dimension of perceived cleanliness ( $F[2, 217] = 2.86$ ,  $p = .05$ ). The uncluttered station (Figure 3) was perceived as most uncluttered ( $M = 5.70$ ,  $SD = 0.83$ ), followed by the lightly (Figure 4,  $M = 5.38$ ,  $SD = 1.07$ ), and heavily cluttered station (Figure 5,  $M = 5.30$ ,  $SD = 1.30$ ). No effects were detected for the cleaned ( $F[2, 217] = 0.32$ ,  $p = .69$ ) and fresh ( $F[2, 217] = 0.06$ ,  $p = .91$ ) dimensions of perceived cleanliness.

## DISCUSSION AND CONCLUSION

With the current study, we showed that perceptions of cleanliness is not only influenced by the design of services, but also by the design of spaces. More specifically, the use of smooth materials and uncluttered architecture were demonstrated to positively influence dimensions of perceived cleanliness. These findings confirm and complement previous research stating that perceived cleanliness may be influenced by other determinants than cleaning quality only (e.g., Vos et al., 2018a, Whitehead, May, & Agahi, 2007). The presence of smooth seating materials and uncluttered architecture as primes that make the concept of cleanliness more accessible in customers through an associative and affective process. Exposure to these stimuli may not only be experienced as pleasant but will also activate associations related to the concept of cleanliness (i.e., smooth = clean). Based on these insights, facility managers may reconsider the way in which perceived cleanliness is managed. Instead of solely increasing cleaning frequencies to improve customers' perception of cleanliness, facility managers might, for example, consider to invest in replacing seating materials, uncluttered architecture, but also in more visible cleaning, scent, and bright colours. A repaint or more visible cleaning staff will have adverse effects when an environment is unclean, so the above interventions should in all cases complement existing cleaning services.

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APPENDIX 1: SEATING MATERIALS AND ARCHITECTURAL CLUTTER



Figure 1 Photo of the train compartment with (smooth) vinyl seating materials.



Figure 2 Photo of the train compartment with (non-smooth) cloth seating materials.



Figure 3 Original photo of the waiting room (uncluttered condition).



**Figure 4** Manipulated photo of the waiting room (lightly cluttered condition).



**Figure 5** Manipulated photo of the waiting room (heavily cluttered condition).

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### Deltapremie

The 'Deltapremie' or Delta Prize is a new leading research prize in the Netherlands focusing on practice-oriented research by professors. The prize is developed for professors who have managed to repeatedly make a special difference with the social impact of their research over the years. It shows where practice and research can come together in an innovative way. Practice-oriented research has acquired a solid place in Dutch society. Almost 700 professors and more than 3,000 teacher-researchers are currently involved. The starting point of the research is always to find solutions for practice-based problems, also by partnering with practice. In this way, practice-oriented research provides applicable solutions to societal challenges.



An independent selection committee selected the winners. The committee consisted of six experts from Erasmus University Rotterdam, Innofest, Delft University of Technology, Netherlands Study Centre for Technology Trends, and the Association of Netherlands Municipalities. In the report the selection committee tributes Mark Mobach and his research group for the impact that they have on the crossroads of various domains from public transport to mental health. Mobach: "We see the prize as enormous encouragement to continue our research into space and organisation in healthcare, education, offices, and cities together with our partners. We extend our research to areas where there are perhaps fewer financial possibilities, such as research with the arts and frailty."

### Research focus area

With his research group, Prof. Mobach wants to contribute to the best buildings for people and organisations. He does so by devising better space and services in a multidisciplinary setting together with students, lecturer-researchers, Ph.D.-students, and postdocs. Better spaces and services for education, offices, and even cities that stimulate healthy behaviour, better healthcare buildings that reduce stress, but also prisons and stations that better meet the needs of society.