ABSTRACT

Purpose – This paper identifies antecedents that influence perceived cleanliness by consulting experts and end users in the field of facilities management (facility service providers, clients of facility service providers, and consultants). Business models were evaluated to understand why some antecedents are adopted by practitioners and others are not.

Design/methodology/approach – A qualitative study, with end users (n = 7) and experts (n = 24) in the field of facilities management, was carried out to identify antecedents of perceived cleanliness. Following the Delphi approach, different research methods including interviews, group discussions and surveys were applied.

Findings – Actual cleanliness, cleaning staff behaviour, and the appearance of the environment were identified as the three main antecedents of perceived cleanliness. Client organisations tend to have a stronger focus on antecedents that are not related to the cleaning process compared to facility service providers.

Practical implications – More (visible) cleaning, maintenance, toilets, scent, architecture, and use of materials offer interesting starting points for practitioners to positively influence perceived cleanliness. These antecedents may also be used for the development of a standard for perceived cleanliness.

Originality/value – A basis was created for the development of an instrument that measures perceived cleanliness and includes antecedents that are typically not included in most of the current standards of actual cleanliness (e.g., NEN 2075, ISSA).

Keywords – Actual cleanliness, perceived cleanliness, antecedents, qualitative, facilities management, standards

Paper type – Research paper
Introduction

One of the aims of in-house and corporate facility managers is to provide clean environments to their end users. By doing so, facility managers ensure that millions of end users work, live, or stay in environments that are both hygienic (Whitehead et al., 2007) and enjoyable (Vilnai-Yavetz and Gilboa, 2010). Following previous research, cleanliness is one of the key factors influencing overall customer satisfaction (e.g., Wakefield and Blodgett, 1996). In the Netherlands, the business of cleanliness is a big business. Dutch organisations spend billions on cleaning services every year, representing approximately one percent of the gross national product (Van Diepen-Knegjens and Veenstra, 2017), highlighting its significance in facilities management.

Very often a distinction is made between actual cleanliness and perceived cleanliness. Actual cleanliness is monitored by trained inspectors through predetermined indicators, such as the actual cleanliness of windows, floors, or furniture (e.g., Sherlock et al., 2009). As opposed to actual cleanliness, end-user perceptions of cleanliness are based on information captured through the senses (Orstad et al., 2016). More or less objective criteria to evaluate actual cleanliness are widely available (e.g., number of fingerprints on a window, number of stains on a table). But what are the antecedents of the more subjective end-user perceptions of cleanliness?

Whitehead et al. (2007) took a first step by performing a qualitative study among end users (patients and medical staff) to identify key antecedents that influence end-user perceptions of cleanliness in a hospital setting. Actual cleanliness, cleaning staff behaviour and, the appearance of the environment were identified as key antecedents. Cleaning staff behaviour is about social interactions between staff members and between staff members and end users (Bitner, 1992). The appearance of the environment includes all antecedents related to ambient conditions, architectural features, and the arrangement of equipment and furnishing in a space (Bitner, 1992). As noted by Whitehead et al. (2007), research into the antecedents of perceived cleanliness is scarce and relatively new. As a result of this knowledge gap, facility
managers are not always able to make well-informed decisions when it comes to end-user perceptions of cleanliness. Therefore, the aim of this paper is to define the concept of end-user perception of cleanliness. Which antecedents of end-user perceptions of cleanliness can be distinguished? Which antecedents are used in practice? And which of these antecedents can be used for the development of an instrument to measure end-user perceptions of cleanliness?

In this paper, observed antecedents of perceived cleanliness were categorized following the categories identified by Whitehead et al. (2007): actual cleanliness, cleaning staff behaviour, and the appearance of the environment. Moreover, the servicescape framework of Bitner (1992) was applied to operationalise the concepts of cleaning staff behaviour and the appearance of the environment. Current literature will be used to develop a set of propositions that will be evaluated by experts in the field of facilities management (FM) and end users.

**Theoretical framework**

**The cleaning industry**

In the Netherlands, cleaning is considered to be a secondary process with a standard quality that does not directly contribute to the success of a client organisation but is relatively easy to produce and buy (Toffolutti et al., 2017; Van Vlijmen and Van Den Hoogen, 2012). The Dutch cleaning market is characterized by a high degree of outsourcing and an oligopolistic market structure with five large facility providers, accounting for more than half of the total market turnover. Additionally, many smaller facility service providers exist as investments and knowledge associated with starting a cleaning business are relatively low. Similar developments and characteristics (i.e., outsourcing rates, market structure) are observed in other Western countries (Haugen and Klungseth, 2017). In the Netherlands, due to the recent economic crisis and the surge of workplace innovations, such as ‘new ways of working and ‘smarter working’ clients have substantially reduced their real-estate properties and thereby
spaces that need to be cleaned. The decrease of market volume, combined with a high degree of outsourcing (demand) and a large number of facility service providers (supply) leads to strong competition based on price instead of quality which is standardized (Van Vlijmen and Van Den Hoogen, 2012).

Following the dynamic market theory (De Jong, 1989) and the product life cycle approach (Anderson and Zeithaml, 1984), the cleaning industry could currently be considered to be in the saturation phase. This stage is characterized by limited market growth, cost control, standardisation, and high levels of competition (Rogier, 1998). Businesses try to differentiate by shifting their focus from price to quality and by investing in innovations (Cooper, 2011). Moreover, the number of mergers increase, leading to a highly centralized market. Based on these insights, we expect that facility service providers try to differentiate and be competitive by shifting their focus from price to quality and by investing in innovations. This empirical expectation will be tested in practice, more specific, the following proposition was formulated:

P1: Competition in the cleaning industry is strong. Facility service providers try to be competitive by shifting their focus from price to quality and by investing in innovations.

Actual cleanliness and end-user perceptions
The relationship between a client and facility service provider is often mediated by a consultant who monitors if the cleaning activities performed by facility service providers are sufficient or not. Literature distinguishes two main methods to evaluate actual cleanliness, namely: visual assessment (Van Ryzin et al., 2008) and microbiological methods (Sherlock et al., 2009). Internationally, visual assessment is considered to be the primary method to assess actual cleanliness. Microbiological methods are believed to be more accurate, but are more expensive and time-consuming. These methods are especially used in healthcare settings in which cleaning reduces the incidence of healthcare-associated infections (Weinstein and Hota, 2004).
In practice, several national and international standards are available to monitor actual cleanliness (e.g., Netherlands: NEN 2075, United States: ISSA). Audits of actual cleanliness most often include visual inspections to evaluate actual cleanliness but are not about actual cleanliness only. The quality of the cleaning process is considered as well by evaluating whether cleaning activities (e.g., sweeping, emptying bins) are performed sufficiently. Actual cleanliness may however relate only weakly to the outcomes that end users experience directly or care about most (Van Ryzin et al., 2008). More subjective outcomes such as scent or architecture are often not included in monitoring systems for cleanliness.

The above studies show that the monitoring system for cleanliness mainly relies on actual cleanliness rather than antecedents of perceived cleanliness. Hence, we expect a similar outcome in practice:

P2: When monitoring cleanliness, practitioners will have a stronger focus on criteria of actual cleanliness as opposed to antecedents of perceived cleanliness.

Influencing end-user perceptions of cleanliness

As appeared from the previous paragraph, antecedents of perceived cleanliness are not well represented in current standards that measure cleanliness. In addition, there is currently no instrument available that can be used to measure perceived cleanliness. In the present paper, a basis for the development of such an instrument was created by identifying antecedents of perceived cleanliness in current literature.

First, actual cleanliness was found to influence end-user perceptions of cleanliness. Two qualitative studies (Whatley et al., 2012, Whitehead et al., 2007) and one quantitative study (Van Ryzin et al., 2008) evaluated the effect of actual cleanliness on perceived cleanliness. The studies suggest that actual cleanliness, and more specifically visible dirt and stains, and presence of litter may indeed influence end-user perceptions of cleanliness (Whatley et al., 2012, Whitehead et al., 2007).
Second, the appearance of the environment influences perceived cleanliness. The appearance of the environment is determined by a set of ambient conditions, architectural features, and the arrangement of equipment and furnishing in a space (Bitner, 1992). Scent, lighting, use of materials, density, and the condition of the environment (i.e., deterioration, aesthetics, architectural order) were identified in literature as antecedents influencing the appearance of the environment. The absence of unpleasant scents and the presence of pleasant scents were expected to positively influence perceptions of cleanliness (Whatley et al., 2012). Molenaar and Hu (2013) found that an environment is perceived as cleaner when lighting is pointed at traces of litter. Broeders et al. (2011) demonstrated that people sitting at a table with a shiny table top ate longer and had more positive perceptions of cleanliness. Whitehead et al. (2007) identified the crowdedness (i.e., human density, number of people in a confined space) of an environment as a predictor of perceived cleanliness. Moreover, several studies focussed on the relationship between environmental variables (i.e., deterioration, aesthetics, architectural order) and perceived cleanliness were evaluated. In the study of Wells and Daunt (2015), the level of deterioration was linked to the perception of cleanliness. Higher levels of deterioration were associated with less positive perceptions of cleanliness. In addition, Whitehead et al. (2007) and Whatley et al. (2012) found that age and aesthetics of spaces influences perceptions of cleanliness: less attractive or older buildings were perceived as less clean. In the study of Da Luz Reis and Dias Lay (2009), architectural order was associated with perceived cleanliness. Architectural order is about the art of balancing individual architectural parts and is able to provoke satisfaction or dissatisfaction (Hasse and Weber, 2012).

Third, cleaning staff behaviour and more specific the interaction between cleaning staff and end users influences perceived cleanliness. Following the servicescape framework of Bitner (1992), the service environment does influence the nature and quality of staff-end-user interactions. Witnessing cleaning staff actively clean (Whatley et al., 2012, Vos et al., 2017)
and more specifically, the appearance and commitment of cleaning staff (Whatley et al., 2012, Whitehead et al., 2007) was associated with more positive end-user perceptions of cleanliness.

Based on literature, we conclude that actual cleanliness, the appearance of the environment, and cleaning staff behaviour can be used to positively influence end-user perceptions of cleanliness. To enrich current literature and contribute to the development of an instrument that measures perceived cleanliness, we want to know which antecedents of perceived cleanliness are used in practice. In line with the previous propositions, we expect that practitioners will mainly focus on actual cleanliness since actual cleanliness is most often the only antecedent included in cleanliness monitoring systems. Leading to the following proposition:

P3: When influencing end-user perceptions of cleanliness, practitioners will have a stronger focus on actual cleanliness as opposed to the appearance of the environment and cleaning staff behaviour.

Method

Delphi method
A Delphi method was used, which is considered to be an interactive method that enables experts to discuss a complex problem through a structured iterative communication process (Rowe and Wright, 2001; Pijls et al., 2017; Wünderlich et al., 2013). Experts were consulted in four rounds with the aim of identifying antecedents of perceived cleanliness. In addition, we wanted to know which criteria are currently used in practice and could possibly be used for the development of an instrument that can be used to measure perceived cleanliness. In a first step information was collected from individual experts by performing face-to-face interviews. With the second step the expert information was collated, analysed, and resubmitted to the experts. The third step entailed the exchange of ideas between the consulted experts in a
group discussion. A survey among the experts was performed in the fourth step. Finally, end users were consulted in the fifth and final step.

Participants
A total of 24 experts (18 men) aged 30 to 60, representing six facility service providers, ten clients, and two consultancy firms, as well as seven end users participated in this study. More specifically, the experts represented a wide range of service organizations in healthcare, amusement, business, travel and government (for an overview: see Table 1). Six of the eighteen experts participated in all phases of this study (one facility service supplier, three client organisations, two consultancy firms). During the different steps of the study some of the participants dropped out (e.g., no reaction, not able to attend). In these cases, new participants with similar background characteristics replaced the participants who dropped out. Despite of our great efforts, we were unable to fully replace all drop-outs from step two (feedback) to step three (group discussion). In line with the principles of the Delphi method (Wünderlich et al., 2013), consistency and continuation were maintained by providing a summary of the results of the previous round to the respondents after step 2, 3, and 4. In the final step of the study, seven experienced end users: member of a fixed customer panel of a Dutch railway company, were consulted (2 males, 5 females) on their perspective on cleanliness. A distinction was made between frequent (n = 4) and infrequent passengers (n = 3).

INSERT TABLE 1 HERE
Procedure

The study consisted of five steps. The procedure and corresponding number of participating experts and end users is visualised in Figure 1.

Step 1 - interviews: In total seventeen experts, together representing fourteen facility service providers, clients, and consultants were interviewed between February and June 2016. In three of the fourteen interviews, two instead of one expert(s) participated. The average duration of the interviews was an hour. Each interview was transcribed, summarized, and presented to the interviewees to verify whether their opinion had been worded correctly. Subsequently, inductive thematic analysis was performed (de Casterle et al., 2012) using the software ATLAS.ti.

Step 2 - feedback: Theoretical propositions that were not mentioned by the experts during the interviews were phrased as propositions and returned to the participants between February and March 2017. The experts individually provided feedback on the propositions by e-mail. Fourteen experts, together representing fourteen facility service providers, clients, and consultants responded to the propositions.

Step 3 – group discussion: During a seminar experts exchanged views on the propositions in a group discussion which took place in April 2017. New information from this seminar complemented previous findings. Fourteen experts, together representing ten facility service providers, clients, and consultants participated in the group discussion. The discussion was led by a professional moderator.

Step 4 – questionnaire: The effectiveness of the identified antecedents was quantified through an online semi-structured questionnaire that was distributed directly after the group discussion. Participants were asked to indicate in which antecedents they had invested in the past two years (i.e., recent developments), and indicate which antecedents they expected to have the strongest effect on perceived cleanliness. Anonymous responses were collected from twelve participants of the discussion. The total response to the questionnaire was higher compared to the number of experts participating in the group discussion since not all experts
were able to participate in the group discussion but received an invitation to fill out the questionnaire.

**Step 5 – feedback end users:** The findings of the previous rounds were presented to a group of end users (n = 7) in August 2017. The goal was to find out if the end users agreed with the views of the experts. Seven participants took part in the group discussion which took 2 hours and 30 minutes and was led by a professional moderator. All participants were experienced members of a fixed customer panel of a Dutch railway company.

Results

**Step one: interviews**

*The cleaning industry*

We expected that competition in the cleaning industry is strong, facility service providers try to be competitive by shifting their focus from price to quality and by investing in innovations (P1). The majority of the facility service providers that they are following a growth strategy in a shrinking market. In order to grow, contracts are being offered at “competitive prices”. Since competitive contracts are in most cases not profitable, facility service providers create revenues by trying to perform as many additional activities (e.g. window cleaning, deep cleaning of carpets) that were initially not included in the contract. Another strategy is to decrease costs by understaffing (e.g., schedule two instead of three employees). One of the participants noted:
“... and unfortunately, that is how the cleaning industry works. They sell you 100 hours of cleaning and perform 80 hours only”

According to the clients and consultants, facility service providers only focus on the deployment of cleaning hours. According to one of the participants, the prominent place of price in the business model combined with fear of losing profits, leads to a certain way of thinking that hinders innovation to take place. Facility service providers reported that interactions with clients are the major source of innovation. As illustrated by the following statement by one of the facility service providers:

“We were shocked when one of our clients asked us to share our vision on hospitality because we did not have one at that time.”

Participants confirmed that competition in the cleaning industry is strong. However, in contrast with our theoretical expectations facility service providers do not invest in innovation and are not shifting their focus from price to quality, the main focus is on standardisation and price.

Actual cleanliness and end-user perceptions
Based on literature we expected that practitioners will have a stronger focus on criteria of actual cleanliness as opposed to antecedents of perceived cleanliness when it comes to the monitoring of cleanliness (P2).

Participants argued that in the contracting phase, both client and facility service provider determine (usually together with a consultant) which indicators will be used to measure actual cleanliness (e.g., floor, walls, furniture). The standards (e.g., NEN 2075, ISSA) do not determine which factors should be included in the cleanliness monitoring system. Standards do however provide guidance on how to evaluate the cleanliness of different indicators of actual cleanliness (e.g., floors, walls, furniture). As noted by one of the participants:
“... If you decide to put in your contract that the table should be evaluated only, the table will be evaluated and all other elements are ignored. The cleanliness monitoring system is based on the cleaning contract and not on standards.”

Surprisingly, some of the participants included antecedents of perceived cleanliness in their cleanliness monitoring system. In such case, inspectors evaluate for example the scent (e.g., pleasant or not) and behaviour of cleaning staff (e.g., friendly or not).

In general, two schools of thought for monitoring cleanliness were observed. First, for some actual cleanliness should be leading rather than the unpredictable perceptions of end users. Second, for others a full or almost full reliance on end-user perceptions of cleanliness is of vital importance. Participants who follow this latter line of reasoning have argued that actual cleanliness does not sufficiently represent end-user perceptions. Instead, in this group it was argued that customer satisfaction scores for cleanliness determine whether the quality of the cleaning services is sufficient or not. In general, both groups of participants do agree that end-user perceptions deserve more attention. There are different ways to do so. For example, by letting inspectors evaluate the scent or temperature of a place. Another way is to pay more attention to antecedents that are expected to have most effect on perceptions of end users. One of the experts puts more emphasis on physical ‘touchpoints’ (e.g., guardrail, seating). These touchpoints receive more attention in daily operations and actual cleanliness audits.

Participants reported that cleanliness is mainly monitored through indicators of actual cleanliness. Antecedents of perceived cleanliness are included if the persons involved in the monitoring of cleanliness have experience in this area.

Influencing end-user perceptions of cleanliness

We have identified multiple antecedents of perceived cleanliness in literature, we wanted to know which antecedents are used in practice. In addition, we expected that practitioners will have a stronger focus on actual cleanliness as opposed to the appearance of the environment
and cleaning staff behaviour when it comes to influencing end-user perceptions of cleanliness (P3).

First, literature indicated that higher levels of actual cleanliness positively influence end-user perceptions of cleanliness. All participants mentioned actual cleanliness as an important antecedent that positively influences perceived cleanliness.

Second, we have identified scent, lighting, materials, density, deterioration, and architectural as antecedents related to the appearance of the environment that positively influence end-user perceptions of cleanliness. During the interviews, participants reported that antecedents as scent, lighting, deterioration, and the use of smooth materials influence perceived cleanliness. The use of fresh scents, such as citrus or lavender, was frequently mentioned and used by participants to positively influence perceived cleanliness. Besides its positive effects on end user perceptions of cleanliness, scent is in many cases also used to conceal unpleasant scents of urine or waste. Moreover, participants reported that high lighting intensities positively influence perceived cleanliness. According to the participants, high light intensities may contribute to the impression that a space is new and well maintained. According to the participants, new spaces do in general have a more clean appearance compared to older spaces. A higher level of actual cleanliness is needed to obtain a similar level of perceived cleanliness in older spaces. Moreover, smooth and natural materials have a clean appearance and are in most cases easier to clean. Participants did not mention the effect of density and architectural order on perceived cleanliness.

Third, literature indicated that interactions between cleaning staff and end users positively influence end-user perceptions of cleanliness. Participants reported witnessing cleaning staff actively clean, experiencing signs of cleanliness, and behaviour of cleaning-staff as antecedents of perceived cleanliness. Witnessing staff actively clean was most frequently mentioned during the interviews. Participants believe that witnessing cleaning staff actively clean gives the feeling that the environment is taken care of. The effect is expected to be even greater when end users are confronted with one and the same cleaner in their work or travel
environment every day. Experiencing physical evidence of the behaviour of cleaning-staff (e.g., cleaning cart, cleaning checklist) might in some cases be sufficient as well. The behaviour of cleaning-staff was frequently mentioned. More specifically, cleaners should try to make eye-contact and have small conversations with end users in order to build relationships.

Participants reported that they do not necessarily focus on actual cleanliness only when influencing end-user perceptions of cleanliness. The main focus of the participants is on the antecedents that are directly related to the cleaning process and are situated in their sphere of influence (i.e., maintenance, scent, cleaning staff behaviour).

**Step two: feedback**

Based on the interviews it remained unclear how participants see the relationship between cleanliness monitoring systems and end-user perceptions of cleanliness (P2). Similarly, the antecedents density and architectural order were not mentioned by the participants.

In the previous step we found that cleanliness is mainly monitored through indicators of actual cleanliness and corresponding cleanliness monitoring systems. Despite most of the participants seeing the shortcomings of focusing on actual cleanliness only, more attention is paid by participants (and especially facility service providers) to actual cleanliness than to end-user perceptions of cleanliness. However, it was noted that actual cleanliness is not the only antecedent of perceived cleanliness. Other antecedents such as scent and deterioration are ignored by most cleanliness monitoring systems.

Almost all participants agreed with the proposition that the number of people in a space influences perceived cleanliness. Following the participants, density is able to influence perceived cleanliness in two different ways. First, density is positive as it covers traces of uncleanliness, but hinders the efficiency of the cleaning process. Second, density is negative as it relates to crowdedness (e.g., irritation) and the idea that other people are a (potential) source of litter, diseases, and unpleasant odours. Density is included in most business models as a variable that limits the efficiency of the cleaning process (P2).
The majority of the participants reported that architecture has more effect on the experience of end users than cleanliness. In general, participants believe that good architecture can have positive effects on the end-user (perceptions of cleanliness), irrespectively of the level of cleanliness. Despite most participants do not include architecture in their cleanliness monitoring systems, architecture is considered to be an effective antecedent of perceived cleanliness.

**Step three: group discussion**

Based on the outcomes of the previous rounds it remained unclear how antecedents of end-user perceptions should be integrated in cleanliness monitoring systems (P2). Furthermore, experts had high expectations about architecture, it remained however unclear how architecture should be defined in the light of perceived cleanliness.

Participants agree that end-user perceptions of cleanliness are poorly represented in most cleanliness monitoring systems. Participants indicated that the two measures should be integrated. For example, by letting inspectors evaluate the scent (e.g., pleasant or not) and the quality of the interaction between cleaning staff and end users (e.g., friendly or not).

All participants agree that good architecture positively influences perceived cleanliness by giving the feeling that the environment is taken care of. The participants reported that good architecture can be modern and new but classic and monumental as well. Light, new, transparent, and ordered were mentioned as architectural variables positively influencing perceived cleanliness.

**Step four: questionnaire**

Overall, it appeared that most participants invested (or advised to invest) in the performance of more (visible) cleaning activities to positively influence the perception of cleanliness (Table 1). Thereafter, participants invested most in maintenance, clean toilets, and scent.
Moreover, we also wanted to quantify the importance (on a 5-point scale) of the different antecedents based on the experience of the participants. It appeared, participants expected more (visible) cleanliness to have the most positive effect on end-user perceptions of cleanliness (Table 2). Moreover, clean toilets, architecture, and use of materials were found to be of major importance respectively. These expectations were even stronger for facility service providers, when compared with clients and consultants.

Step five: feedback end users

End users identified cleanliness, visibility of cleaning staff, architecture, use of materials, and scent as most important antecedents of end-user perceptions of cleanliness. These findings were consistent with the findings in the expert groups. Only small differences were observed between the experts and end users. Interestingly, end users mentioned communication as an important antecedent of end-user perceptions of cleanliness. Especially, to create awareness among end users about their efforts to create clean and appealing service environments. Although end users did refer to the state and quality of the built environment, maintenance was not mentioned explicitly.
Conclusions

The purpose of this study was to define the concept of end-user perceptions, find out which antecedents of perceived cleanliness can be distinguished, and which antecedents are used in practice and could possibly contribute to the development of an instrument that can be used to measure perceived cleanliness.

Competition in the cleaning industry is strong. Based on literature, we expected that facility service providers try to be competitive and successful by shifting their focus from price to quality and investing in innovations. These expectations were not confirmed. Facility service providers do not invest in innovation and their focus is not shifting from price to quality. Their main focus is on standardisation of cleaning services and price.

Cleanliness can be monitored through indicators of actual cleanliness (i.e., actual cleanliness of flooring or furniture, quality of cleaning activities) and antecedents of perceived cleanliness (i.e., actual cleanliness, cleaning staff behaviour, appearance of the environment). Due to the lack of standards and instruments that monitor perceived cleanliness, more attention is paid to indicators of actual cleanliness than to antecedents of perceived cleanliness. National and international standards on how to monitor actual cleanliness are widely available.

The main antecedents of end-user perceptions of cleanliness that emerged from our analysis are: actual cleanliness, cleaning staff behaviour, and the appearance of the environment. More specifically, the first four antecedents that were mentioned in Table 2 and Table 3 and that were consisted with the findings of the discussion with end users (i.e., more (visible) cleaning, maintenance, toilets, scent, architecture, and use of materials) offer interesting starting points for research on perceived cleanliness. By doing so, a basis may be provided for the development of an instrument for perceived cleanliness.
Discussion

Theoretical and practical implications
This study has both implications for current literature and practice. The study contributes to the understanding of the concept of end-user perceptions of cleanliness and antecedents that influence perceived cleanliness. Compared to similar studies of Whitehead et al. (2007) and Whatley (2012), we have taken a broader perspective by focussing not on the healthcare sector and end users (i.e., patients and medical staff) only, but instead focus on the FM sector as a whole by consulting end users and experts with different backgrounds. The results of this study are applicable to different types of service environments, however, the relative importance of the antecedents may vary depending on the type of environment and end user.

The identified key antecedents may allow practitioners in the cleaning industry to better understand and identify different antecedents that positively influence the perceptions of their end users. The cleaning industry does typically not focus on antecedents other than actual cleanliness. The development of an instrument that includes other antecedents (i.e., cleaning staff behaviour, appearance of the environment) as well may contribute to the understanding that end user perceptions are not affected by actual cleanliness only. But what should the instrument for perceived cleanliness look like? In contrast to standards of actual cleanliness, perceived cleanliness should be monitored by end users, for example by monitoring the quality of different antecedents through questionnaires or more interactive methods such as customer panels or online feedback monitors.

The development of this instrument might have serious consequences for the business models of facility service providers. The current focus of business models should shift from selling as many hours as possible to selling the highest end-user experience as possible. One could think of an approach in which clients and facility service providers agree on a certain ‘level’ of end-user experience (e.g., 7.0 on a scale from 0-10). Based on their experience, facility service providers determine how many hours of cleaning are needed to achieve the agreed end-user experience. Prices are fixed for the duration of the contract and based on the
level of end-user experience multiplied by the number of full-time equivalents (FTEs), square
meters, or desks the client is responsible for. As a result, facility service providers might decide
to invest in (research on) antecedents that are not necessarily related to actual cleanliness or
the cleaning process.

Limitations and suggestions for future research
The present study is limited because of different reasons. Despite of our high efforts, nine of
the twenty four experts, representing one facility service provider, three clients, and two
consultants participated in all phases of this study. Consistency and continuation was
maintained by providing a summary of the results of the previous round to the respondents
after step 2, 3, and 4. In addition, findings of the experts were verified by seven experienced
members of a fixed customer panel of a Dutch railway company. Although the groups of
participants were small, results of the different steps were valuable and resulted in a relevant
foundation for future research on end-user perceptions of cleanliness.

Differences were noted between the clients and facility service providers during the
discussion. Clients came up with more compelling topics and answers compared to the facility
service providers. A possible reason could be that facility service providers do not care about
the topic and are mainly concerned with selling cleaning activities. Our expectation is that
facility service providers were also on the background due to the presence of competitors and
lucrative clients. Therefore, facility service providers were given the opportunity to share their
view through a survey in the fourth round.

Whereas the current study mainly focusses on the experience of practitioners in the
field of FM, future research should consider the end-user perceptions of cleanliness as well. A
first step to do so, is by developing an instrument that can be used to monitor end-user
perceptions of cleanliness. Despite the importance of cleanliness, no instrument is available
to monitor end-user perceptions of cleanliness in a reliable way.
In line with the development of the instrument for perceived cleanliness, additional research on antecedents of perceived cleanliness is needed. It would for example relevant to evaluate the relative importance of the antecedents in different settings (e.g., office, hospital, airport), especially in the light of the development of the instrument for perceived cleanliness.

Finally, future research should investigate the combined effect of actual cleanliness and, for example scent or architecture on end-user perceptions of cleanliness in real-life settings. Most of the studies that were mentioned in our literature review, were qualitative or performed in a lab-setting.

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