

Operational Performance of Employees in Tourism Establishments: The Impact of Hotel Guestroom Interior Design on the Time Efficiency of Housekeeping Tasks - A Case Study of a Five-Star Hotel in Damascus

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Abstract - Housekeeping is a core operational function in hospitality establishments, and its efficiency is closely associated with the time required to prepare guestrooms and complete routine cleaning tasks. Although hotel guestroom interior design is commonly addressed from the perspective of guest experience and aesthetic quality, its implications for housekeeping employees who repeatedly use guestrooms as workplaces have received comparatively limited attention. This study examined the impact of guestroom interior design on the time efficiency of housekeeping tasks. A quantitative repeated-measures case-study design was adopted. Twelve housekeeping employees in a five-star hotel in Damascus were assessed across five guestroom design models, coded A–E. Each room measured 4 × 3 m. Flooring materials across the designs included carpet, parquet, and marble, while cabinets, tables, and surfaces were primarily finished in melamine. Five time-based indicators were examined: bed-making time, surface-cleaning time, floor-cleaning time, storage-access time, and total room preparation time. Friedman tests showed statistically significant differences among the five designs in total preparation time, $\chi^2(4) = 23.34$, $p < .001$, as well as in bed-making, surface-cleaning, and floor-cleaning times. No statistically significant difference was found for storage-access time. Design E recorded the lowest mean total preparation time (24.33), compared with 28.25 for Design A, representing a descriptive reduction of approximately 13.9%. Floor cleaning was the task most strongly associated with design variation, Kendall's $W = .551$. The findings indicate that guestroom interior design is associated with the temporal efficiency of several housekeeping tasks and support the inclusion of housekeeping operational requirements as an additional criterion in hotel guestroom design.

Keywords: operational performance; housekeeping; interior design; hotel guestrooms; task completion time; time efficiency; room attendants; hospitality establishments.

1. INTRODUCTION

Human resources constitute a central operational asset in tourism and hospitality establishments, where the consistency, speed, and quality of service delivery depend heavily on the performance of employees. Within hotels, the housekeeping department occupies a particularly important position because it is directly responsible for maintaining and preparing guestrooms for occupancy. The work of room attendants is characterized by repeated task cycles, substantial physical activity, time pressure, and direct interaction with the physical components of the guestroom.

Previous research has demonstrated that room-attendant productivity is influenced not only by employee-related factors but also by room type and operational conditions. Tavitiyaman et al. (2022), using direct observation and time checks of 22 hotel guestrooms, found that room type and operational obstacles increased the time required to clean guestrooms and consequently affected employee productivity. ([Taylor & Francis Online](#))

This observation is particularly important because it positions the hotel guestroom not merely as a product intended for the guest, but also as a recurring workplace for housekeeping staff. The bed, floor, cabinets, horizontal surfaces, furniture, and circulation areas all constitute elements with which the employee must interact repeatedly during the cleaning and preparation process.

The physical demands associated with housekeeping work are also well established. Mammen (2022) reported an association between ergonomic problems and the time required by hotel housekeepers to clean guestrooms, indicating that physical characteristics of work conditions may have consequences not only for employee health but also for work efficiency. ([Taylor & Francis Online](#))

Similarly, Brazil et al. (2023) found that hotel housekeepers remained exposed to high postural risk during several common housekeeping activities, including scrubbing and vacuuming, despite the introduction of updated occupational standards. (ScienceDirect)

The occupational relevance of the issue is further supported by systematic evidence. Sánchez-Rodríguez et al. (2024), in a systematic review and meta-analysis involving 19 studies, reported a high prevalence of musculoskeletal disorders among hotel housekeepers and cleaners, with the lower back, shoulders, and wrists/hands among the most commonly affected anatomical areas. (PubMed) More recently, Sánchez-González et al. (2026) similarly concluded that hotel housekeepers remain a vulnerable occupational group exposed to substantial biomechanical loads, repetitive movements, and high work demands. (PubMed)

Research in the broader built-environment field also supports the proposition that workplace characteristics can affect worker performance. A systematic review by Braga et al. (2025) identified numerous models linking indoor environmental conditions with productivity and emphasized that environmental effects on work performance vary according to context, task type, and measurement approach. (ScienceDirect) Zhang et al. (2023) likewise found that spatial arrangement, furniture, privacy, and other perceived workplace characteristics are among the physical-environment factors associated with worker satisfaction and performance. (ScienceDirect)

Nevertheless, much of the available hospitality literature has focused either on guest experience, employee health, ergonomic risk, or aggregate housekeeping productivity. Relatively limited attention has been directed toward comparing alternative hotel-room interior designs while holding the functional program approximately constant and examining how those differences correspond to task-completion time.

Accordingly, the present study examines five interior-design models for hotel guestrooms of the same nominal dimensions and investigates whether the design model is associated with differences in the time required by housekeeping staff to complete specific cleaning and preparation tasks.

2. RESEARCH PROBLEM

Hotel guestrooms are typically designed primarily according to guest-oriented criteria, including aesthetics, comfort, brand identity, functionality, and perceived quality. However, each guestroom simultaneously functions as a workplace repeatedly entered, cleaned, organized, and serviced by housekeeping employees.

Differences in the configuration of beds, floors, surfaces, cabinets, furniture, and circulation may alter the sequence, duration, or complexity of housekeeping tasks. Therefore, two rooms with similar dimensions and hospitality functions may nevertheless create different operational demands for employees.

The research problem is consequently expressed through the following central question:

To what extent does hotel guestroom interior design affect the time efficiency of housekeeping tasks?

3. RESEARCH GAP

Three related gaps inform the present study.

First, contemporary research on hotel housekeepers has predominantly examined occupational injury, ergonomic risk, physical workload, musculoskeletal pain, and working conditions. These studies establish the physical intensity of housekeeping work but do not generally compare multiple interior-design solutions as an operational variable. (PubMed)

Second, studies of housekeeping productivity have confirmed that room type and operational obstacles can influence cleaning time, but room type is generally treated as an operational category rather than decomposed or examined as an interior-design condition. (Taylor & Francis Online)

Third, the broader built-environment literature recognizes that workplace design and environmental conditions may influence performance, yet these relationships are most frequently investigated in office environments rather than housekeeping settings. (ScienceDirect)

The present study therefore contributes by examining five alternative hotel-room design models and linking them to repeated time measurements for the same group of housekeeping employees.

4. RESEARCH AIM AND OBJECTIVES

The main aim of the study is to determine whether differences in hotel guestroom interior design are associated with differences in the time efficiency of housekeeping tasks.

The specific objectives are to:

1. compare bed-making time among five hotel-room design models;
2. compare surface-cleaning time among the five models;

3. compare floor-cleaning time among the five models;
4. compare storage-access time among the five models;
5. compare total room cleaning and preparation time;
6. identify which housekeeping task is most sensitive to differences among the design models; and
7. derive operational implications for hotel management, human-resource management, and interior design.

5. RESEARCH QUESTIONS

- RQ1.** Are there statistically significant differences in total room preparation time among the five guestroom design models?
- RQ2.** Are there statistically significant differences in bed-making time among the five models?
- RQ3.** Are there statistically significant differences in surface-cleaning time among the five models?
- RQ4.** Are there statistically significant differences in floor-cleaning time among the five models?
- RQ5.** Are there statistically significant differences in storage-access time among the five models?
- RQ6.** Which housekeeping task demonstrates the greatest sensitivity to differences among the design models?

6. RESEARCH HYPOTHESES

- H1.** Total room preparation time differs significantly among the five guestroom design models.
- H1a.** Bed-making time differs significantly among the five design models.
- H1b.** Surface-cleaning time differs significantly among the five design models.
- H1c.** Floor-cleaning time differs significantly among the five design models.
- H1d.** Storage-access time differs significantly among the five design models.

7. LITERATURE REVIEW

7.1 Housekeeping Performance in Hospitality Operations

Housekeeping performance can be conceptualized through the efficiency with which employees convert labor time into completed guestrooms. From an operational perspective, room preparation time constitutes an observable and quantifiable input to the provision of hotel accommodation.

Tavitiyaman et al. (2022) examined room-attendant productivity through an input–output perspective and demonstrated that the cleaning process is sensitive to room characteristics and operational constraints. Their findings are especially relevant because they reinforce the usefulness of direct time measurement in understanding housekeeping productivity. ([Taylor & Francis Online](#))

Task-completion time is therefore an appropriate operational indicator when the objective is not to assess the employee's overall job performance, but rather to compare the temporal efficiency of repeated standardized tasks.

7.2 Physical Demands of Housekeeping

Housekeeping involves a combination of repetitive motion, bending, reaching, bed making, surface wiping, floor cleaning, lifting, pushing, and handling supplies. These demands distinguish housekeeping from many other hospitality jobs.

Mammen (2022) found that ergonomic difficulties were associated with greater time requirements for room cleaning, directly linking physical task conditions with temporal efficiency. ([Taylor & Francis Online](#))

Brazil et al. (2023) reported high RULA scores for several common housekeeping tasks, indicating continued exposure to potentially harmful postural conditions. ([ScienceDirect](#))

The systematic review and meta-analysis by Sánchez-Rodríguez et al. (2024) further confirmed the substantial occupational burden among housekeepers and cleaners. Among the studies included in the meta-analysis, the pooled prevalence of lower-back musculoskeletal disorders was 53.9%, followed by shoulder and wrist/hand disorders. ([PubMed](#))

The more recent synthesis by Sánchez-González et al. (2026) reinforced these findings and identified biomechanical load, repetitive movement, work organization, and specific work requirements such as the number of beds made per shift among relevant occupational exposures. ([PubMed](#))

7.3 Interior Design as a Work Environment

Interior design determines the arrangement of physical objects and surfaces within which work is performed. Although hotel-room design serves guest-centered purposes, it simultaneously structures housekeeping activity.

The relationship between the physical environment and work performance is well recognized outside hospitality. Zhang et al. (2023), in a systematic review of workplace studies, identified spatial arrangement, furniture, indoor climate, privacy, and environmental characteristics among factors associated with occupant satisfaction and performance. ([ScienceDirect](#))

Braga et al. (2025) reviewed productivity models linked to indoor environmental quality and emphasized the importance of task type and context when evaluating the performance implications of the built environment. ([ScienceDirect](#))

Although the present study does not assess indoor environmental quality directly, these findings support the broader conceptual proposition that physical workplace conditions can influence the efficiency with which tasks are carried out.

7.4 Time Efficiency as an Operational Indicator

The present research adopts time efficiency rather than overall productivity as the principal outcome. This distinction is important because overall employee productivity may incorporate output volume, quality, labor cost, error rate, and service standards.

In contrast, the available empirical data measure the time required for defined tasks. Thus, task-completion time is treated as an indicator of operational efficiency rather than as a comprehensive measure of individual productivity.

The conceptual relationship examined is therefore:

Guestroom Interior Design → Task-Completion Time → Operational Time Efficiency

8. METHODOLOGY

8.1 Research Design

A quantitative repeated-measures case-study design was employed.

The repeated-measures approach was appropriate because the same 12 housekeeping employees were assessed across each of the five guestroom models. Consequently, the observations across designs were related rather than statistically independent.

The study examined five guestroom design models, designated A, B, C, D, and E. Each room measured approximately 4×3 m, corresponding to a floor area of approximately 12 m². The five guestroom interior design models evaluated in this study are presented in **Appendix A (Figures A1–A5)**.

Each room measured approximately 4×3 m, corresponding to a floor area of approximately 12 m².

The interior finishes represented among the room designs included carpet, parquet, and marble flooring. Cabinets, tables, and principal interior surfaces were executed in melamine.

8.2 Participants

The dataset comprised **12 housekeeping employees**.

No names or direct personal identifiers were included in the analytical dataset; participants were treated as Worker 01 through Worker 12.

The 12 employees were repeatedly measured across all five guestroom designs, resulting in:

12 participants $\times$ 5 designs = 60 worker–design observations.

Because these 60 observations were nested within 12 individuals, they were not treated as 60 statistically independent participants.

8.3 Variables and Measurements

Five temporal indicators were analyzed:

T1 – Bed-Making Time: time required to make and prepare the bed.

T2 – Surface-Cleaning Time: time required to clean the principal room surfaces.

T3 – Floor-Cleaning Time: time required to clean the room floor.

T4 – Storage-Access Time: time required to access and handle the storage/cabinet area.

T5 – Total Room Preparation Time: total time required to complete the four recorded tasks.

The source table contains these five measurements for each worker across the five room designs. The same structure continues through all 12 employees.

8.4 Statistical Analysis

Descriptive statistics were calculated for every task and design, including:

- mean;

- standard deviation;
- median;
- minimum;
- maximum.

Because the study involved a small sample and five related measurements from each participant, the **Friedman test** was used as the principal inferential procedure to compare room models.

The significance threshold was set at:

$\alpha = .05$.

For statistically significant Friedman tests, pairwise comparisons were conducted using the **Wilcoxon signed-rank test**.

To account for multiple pairwise comparisons among five room designs, **Bonferroni adjustment** was applied.

Kendall's W was calculated as an effect-size indicator for the Friedman test.

9. RESULTS

9.1 Descriptive Statistics

Table 1 presents the mean and standard deviation for each housekeeping task across the five room designs.

Table 1. Descriptive Statistics of Housekeeping Task Times

Task	A Mean $\pm$ SD	B Mean $\pm$ SD	C Mean $\pm$ SD	D Mean $\pm$ SD	E Mean $\pm$ SD
Bed making	6.17 $\pm$ 0.39	5.33 $\pm$ 0.78	5.25 $\pm$ 0.45	4.83 $\pm$ 0.94	5.33 $\pm$ 0.49
Surface cleaning	6.67 $\pm$ 0.89	6.58 $\pm$ 0.79	8.00 $\pm$ 0.00	6.67 $\pm$ 0.49	6.67 $\pm$ 0.49
Floor cleaning	10.25 $\pm$ 1.06	9.00 $\pm$ 1.21	9.67 $\pm$ 0.89	9.50 $\pm$ 0.80	7.67 $\pm$ 1.37
Storage access	5.17 $\pm$ 0.39	5.00 $\pm$ 0.85	5.00 $\pm$ 0.00	4.83 $\pm$ 0.83	4.67 $\pm$ 0.98
Total preparation time	28.25 $\pm$ 2.26	25.92 $\pm$ 2.47	27.92 $\pm$ 1.31	25.83 $\pm$ 1.19	24.33 $\pm$ 2.50

The raw study data show the repeated measurement of the same temporal tasks across the five designs for each worker.

The lowest mean total preparation time was observed for Design E, whereas the highest mean was recorded for Design A.

The difference between the two mean values was:

$$28.25 - 24.33 = 3.92$$

representing a descriptive reduction of approximately:

13.9%

relative to Design A.

9.2 Bed-Making Time

Mean bed-making time ranged from **4.83** in Design D to **6.17** in Design A.

The Friedman test showed a statistically significant difference among the five designs:

$$\chi^2(4) = 19.13, p < .001, \text{Kendall's } W = .399.$$

Thus, **H1a was supported**.

Post-hoc Wilcoxon comparisons with Bonferroni adjustment identified statistically significant differences between:

- **A and C, adjusted $p = .010$**

- A and E, adjusted $p = .020$

The remaining pairwise differences did not remain statistically significant following correction.

9.3 Surface-Cleaning Time

The highest surface-cleaning mean occurred in Design C:

M = 8.00

compared with means of approximately 6.58–6.67 for the remaining designs.

The Friedman test indicated a statistically significant design effect:

$\chi^2(4) = 22.37, p < .001$, Kendall's $W = .466$.

Thus, **H1b was supported**.

Bonferroni-adjusted Wilcoxon comparisons indicated significant differences between:

- A and C, adjusted $p = .039$
- B and C, adjusted $p = .020$
- C and D, adjusted $p = .005$
- C and E, adjusted $p = .005$

These results indicate that the statistically significant difference in surface-cleaning time was concentrated primarily around Design C.

9.4 Floor-Cleaning Time

Floor-cleaning time demonstrated the largest variation across the five designs.

The mean values were:

- A = 10.25
- B = 9.00
- C = 9.67
- D = 9.50
- E = 7.67

The Friedman test produced:

$\chi^2(4) = 26.46, p < .001$, Kendall's $W = .551$.

Thus, **H1c was supported**.

Among all housekeeping tasks, floor cleaning produced the largest Kendall's W value, indicating the strongest relationship with differences among room models.

Bonferroni-adjusted comparisons identified significant differences between:

- A and E, adjusted $p = .020$
- C and E, adjusted $p = .005$
- D and E, adjusted $p = .010$

The mean floor-cleaning time in Design E was approximately **25.2% lower** than in Design A.

9.5 Storage-Access Time

Mean storage-access time ranged from 4.67 in Design E to 5.17 in Design A.

However, the Friedman test showed no statistically significant difference:

$\chi^2(4) = 6.45, p = .168$, Kendall's $W = .134$.

Accordingly, **H1d was not supported**.

The result suggests that, within the five room designs examined, access to cabinets and storage generated considerably less temporal variation than bed making, surface cleaning, or floor cleaning.

9.6 Total Room Preparation Time

The mean total times were:

- Design A: 28.25
- Design B: 25.92
- Design C: 27.92
- Design D: 25.83
- Design E: 24.33

The Friedman test demonstrated a statistically significant difference in overall preparation time:

$$\chi^2(4) = 23.34, p < .001, \text{Kendall's } W = .486.$$

Therefore, the principal hypothesis **H1 was supported**.

Bonferroni-adjusted pairwise analysis showed significant differences between:

- A and E, adjusted $p = .020$
- C and D, adjusted $p = .020$
- C and E, adjusted $p = .005$

The mean ranks for total room preparation time were:

Design	Mean Rank
A	4.00
B	2.71
C	4.17
D	2.46
E	1.67

Because lower time represents greater time efficiency, Design E exhibited the most favorable overall temporal profile.

9.7 Summary of Hypothesis Testing

Table 2. Friedman Test Results

Hypothesis	Outcome	χ^2	p	Kendall's W	Result
H1a	Bed-making time	19.13	< .001	.399	Supported
H1b	Surface-cleaning time	22.37	< .001	.466	Supported
H1c	Floor-cleaning time	26.46	< .001	.551	Supported
H1d	Storage-access time	6.45	.168	.134	Not supported
H1	Total preparation time	23.34	< .001	.486	Supported

The effect-size pattern demonstrates that floor cleaning was the task most strongly associated with differences among the room designs, followed by total preparation time and surface cleaning.

10. DISCUSSION

The study provides empirical evidence that differences among hotel guestroom interior-design models are associated with measurable variation in the time required by housekeeping employees to perform routine tasks.

The central finding was the statistically significant difference in total room preparation time across the five design models. Design E produced the lowest mean total time, whereas Design A produced the highest. The difference of approximately 13.9% is operationally meaningful because housekeeping activities are repeated across multiple rooms and work shifts. Even relatively small differences in the time required for one room can accumulate when applied repeatedly at the departmental level.

This finding is consistent with Tavitiyaman et al. (2022), who found that room type and operational characteristics could add time to room-cleaning procedures and affect room-attendant productivity. ([Taylor & Francis Online](#)) The present study extends this logic by demonstrating that, even among rooms sharing a common hotel context and similar nominal dimensions, alternative interior-design models may correspond to different temporal performance profiles.

The strongest statistical effect occurred in **floor-cleaning time**. Kendall's W of .551 was greater than the corresponding effect sizes for bed making, surface cleaning, storage access, and total preparation time. This suggests that tasks requiring interaction with a large proportion of the room's physical area may be particularly sensitive to room configuration.

Floor cleaning depends on the relationship among floor area, furniture footprint, edges, obstacles, accessible zones, and circulation continuity. The finding therefore supports the interpretation of the room as an operational workspace rather than merely a visual composition.

The particularly low floor-cleaning mean for Design E was a major contributor to its favorable total preparation time. However, because the five designs vary in more than one physical characteristic, the present data do not isolate a single material, furniture element, or spatial configuration as the causal factor. The result should therefore be interpreted at the level of the **design model as a whole**.

Surface-cleaning time also differed significantly, with Design C producing consistently higher values than the other models. The pairwise results demonstrate that C differed significantly from A, B, D, and E after correction. This finding suggests that the distribution, number, accessibility, or configuration of surfaces may contribute materially to the time burden of housekeeping tasks.

The finding is consistent with the broader workplace-design literature showing that physical arrangement and furniture configuration can influence employee experience and performance. Zhang et al. (2023) identified spatial and furniture-related characteristics as important workplace factors, although their evidence was derived primarily from office environments. ([ScienceDirect](#))

Bed-making time also varied significantly across designs. Bed making is a physically demanding and repetitive task in hotel housekeeping and has been identified in contemporary occupational research as a relevant source of physical workload. Sánchez-González et al. (2026) specifically identified the number of beds made during work as one of the occupational exposures associated with housekeeping health outcomes. ([PubMed](#))

The results therefore suggest that bed configuration and its relationship to surrounding room elements warrant explicit consideration during hotel-room design.

By contrast, storage-access time showed no statistically significant difference among the five designs. This is an equally important finding because it demonstrates that the effect of interior design was not uniform across all tasks. The cabinet and storage configurations may have been sufficiently similar in operational terms that they did not produce meaningful temporal differences, or storage access may simply represent a task less sensitive to overall room configuration.

The differentiated pattern of findings strengthens the interpretation that specific housekeeping tasks respond differently to the physical environment.

The findings also correspond with contemporary ergonomic research emphasizing that housekeeping performance takes place under substantial physical demands. Mammen (2022) found that ergonomic problems were associated with increased cleaning time, while Brazil et al. (2023) documented persistently elevated postural risks in routine housekeeping tasks. ([Taylor & Francis Online](#))

Although the present study did not directly measure posture, musculoskeletal strain, or physiological effort, its time-based findings provide an operational complement to this literature. A room layout that reduces unnecessary task duration may potentially contribute to more efficient work organization, although health effects would require separate ergonomic measurement.

11. MANAGERIAL IMPLICATIONS

The findings have implications for both hotel operations and human-resource management.

First, room design should be considered as an operational resource rather than exclusively a guest-experience issue. If different room configurations systematically require different preparation times, interior design can influence housekeeping scheduling, staffing requirements, and daily workload.

Second, housekeeping managers may benefit from participating earlier in design and renovation processes. Their operational knowledge can identify furniture, finishes, and spatial relationships that increase cleaning complexity before these elements are implemented at scale.

Third, time-efficient room configurations may support more predictable work allocation. This is particularly relevant because room attendants often work under substantial physical and temporal demands. The occupational-health literature consistently identifies housekeeping as a high-risk hotel occupation. ([PubMed](#))

Fourth, hotel operators evaluating renovation alternatives should consider not only capital cost, guest aesthetics, and durability but also the recurring labor implications of each design.

12. INTERIOR DESIGN IMPLICATIONS

The study demonstrates the value of incorporating **housekeeping operability** into the design brief for hotel guestrooms.

A hotel-room interior should therefore be evaluated not only according to:

- guest comfort;
- visual identity;
- material quality;
- aesthetics;
- brand image;

but also according to:

- ease of floor cleaning;
- accessibility of surfaces;
- efficiency of bed preparation;
- continuity of cleaning paths;
- accessibility around furniture;
- ease of maintaining storage elements; and
- total time required to return the room to service.

The strong statistical result for floor cleaning suggests that the relationship between furniture layout and cleanable floor area deserves particular attention in future hotel-room design.

Similarly, the elevated surface-cleaning time recorded for Design C indicates that horizontal and vertical surface configuration should be assessed from a maintenance perspective alongside its aesthetic role.

13. HUMAN-RESOURCE IMPLICATIONS

From a human-resource perspective, the physical environment represents one component of the work system in which employee performance occurs.

The evidence from occupational research indicates that hotel housekeepers face repetitive and physically demanding work, and recent systematic reviews continue to document a substantial prevalence of musculoskeletal problems among this occupational group. ([PubMed](#))

Consequently, improving the operational efficiency of the physical workspace may complement conventional HR interventions such as training, workload allocation, scheduling, and occupational safety programs.

The present study therefore supports a broader engineering-management perspective in which employee performance is considered jointly with workplace design.

14. THEORETICAL CONTRIBUTION

The study contributes to the integration of three research domains:

hospitality management,
human-resource and operational performance, and
interior architecture.

Its principal conceptual contribution is the treatment of the hotel guestroom as a **dual-use environment**:

1. a hospitality product experienced by the guest; and
2. an occupational workspace repeatedly used by housekeeping employees.

This dual-use perspective extends hotel-room design evaluation beyond guest satisfaction and proposes **housekeeping time efficiency** as an additional performance criterion.

The study also contributes methodologically by using repeated measures across multiple designs rather than relying solely on subjective preferences.

15. Limitations

The study is limited to one five-star hotel context in Damascus and a sample of 12 housekeeping employees. The findings should therefore be interpreted as case-based evidence rather than as estimates representative of all hotels or housekeeping workers.

The analysis evaluated five room-design models as integrated design conditions. It did not isolate individual interior-design variables such as furniture dimensions, exact clearances, floor-material type, furniture density, or cabinet geometry.

The available dataset was based exclusively on time measurements and did not include direct measures of cleaning quality, ergonomic posture, physiological workload, employee fatigue, or guest satisfaction.

Accordingly, the study evaluates **time efficiency** rather than overall employee productivity.

Future studies may strengthen the model by combining time measurements with architectural plans, quantified furniture clearances, ergonomic assessment, cleaning-quality audits, and physiological or perceived workload measures.

16. CONCLUSION

This study examined whether differences among five hotel guestroom interior-design models were associated with variation in the time required by 12 housekeeping employees to perform routine room-preparation tasks.

Significant differences were identified in:

- bed-making time;
- surface-cleaning time;
- floor-cleaning time; and
- total room preparation time.

No statistically significant difference was found in storage-access time.

The strongest relationship with design occurred in floor-cleaning time, followed by total preparation time and surface cleaning.

Design E demonstrated the lowest mean total preparation time, while Design A recorded the highest. The difference between the two represented approximately 13.9% of the mean preparation time of Design A.

The findings demonstrate that hotel guestroom interior design is not operationally neutral. Differences in design configuration can correspond to meaningful variation in the time employees require to perform housekeeping tasks.

The results therefore support integrating housekeeping-operability criteria into hotel-room design and renovation decisions.

From an engineering-management perspective, the study shows that built-environment decisions can interact with human performance and operational efficiency. The design of tourism facilities should consequently be approached not only as an architectural and aesthetic process, but also as a managerial decision capable of affecting the everyday work system of hotel employees.

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Appendix A

Guestroom Interior Design Models

Figure A1. Guestroom Interior Design – Model A



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Figure A4. Guestroom Interior Design – Model D



Figure A5. Guestroom Interior Design – Model E

