

## **Physical Work Environment Satisfaction and Productivity of Working Adults in Malaysia**

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Studies have established that satisfaction with the physical work environment has an impact on individual productivity. This study investigated the influence of physical work environment satisfaction (including environmental design, welfare facilities, work organization, equipment and tools, and health and safety) on the productivity of Malaysian employees as they gradually return to physical workplaces post-pandemic. A total of 253 working adults (135 males, 118 females, mean age = 39.00 years) participated in this cross-sectional study. The results supported the hypotheses that the physical work environment collectively, and environmental design and tools and equipment specifically, predict employee productivity. These findings emphasize the importance for organizations to consistently maintain satisfaction with the physical work environment in order to enhance employee productivity.

*Keywords:* productivity, physical work environment satisfaction, environmental design, tools and equipment, Malaysia

In recent years, a growing body of research has emphasized the relationship between satisfaction with the physical work environment and individual productivity. This connection is of paramount importance for both employees and organizations, as it influences not only individual task efficiency but also broader organizational performance. Van der Voordt and Jensen (2021) underscored this connection, emphasizing the influence of a positive work environment (i.e., indoor air quality, 'green' building and sit-stand work) on employee health and productivity. Budie et al. (2019) extended this perspective to the organizational level, emphasizing the broader implications of work environment satisfaction for overall productivity and organizational performance.

### *Research gap*

While previous studies have established the general connection between work environment satisfaction and productivity, they often lack a comprehensive exploration of the specific components within the physical work environment that predict productivity. This omission leaves a fundamental question unanswered: What are the precise elements of the physical work environment that most profoundly influence employee productivity? To address this gap, our study aims to comprehensively investigate whether employee satisfaction with the physical work environment predicts productivity and provides valuable insights for creating a more productive, safer, and employee-friendly work environment.

### *Problem statement*

It is crucial to acknowledge the persistent challenges posed by work-related accidents and illnesses in the global workforce. Amidst this recognition, there remains a pressing concern underscored by global statistics. According to data from the International Labour Organization (ILO) and the United Nations Global Compact (2021), work-related accidents and illnesses claim the lives of approximately 2.78 million workers annually, with 374 million others suffering non-fatal work-related injuries and illnesses. The situation is no different in Malaysia, as highlighted by Mahidin (2021), who reported a staggering 32,674 occupational accidents in 2020 alone, occurring at a rate of 2.18 per 1,000 workers. Among these accidents, three categories account for 62.8 percent of all cases: falls, collisions with objects, and other unclassified accidents.

A common thread among these incidents is the role of the work environment, encompassing factors such as transportation equipment, lifting devices, and machinery, as primary contributors to accidents. These stark statistics underscore the urgent need for effective safety measures in the workplace, not only to prevent accidents but also to safeguard the well-being of workers and ultimately create a more productive environment. While the importance of a conducive work environment for business success is acknowledged, there is still much to understand about employee satisfaction with specific aspects of the physical work environment and its direct impact on productivity. This holds the potential to inform organizational practices and policies aimed at enhancing both employee well-being and productivity. This emphasizes the urgency of creating safer workplaces, where a conducive work environment is a vital component.

### *Significance of study*

Our research aligns with the broader objective of promoting business success. Kim and Park (2021) established that occupational accidents may affect the business performance of companies through work stoppage, the decline of corporate image, worsening of labor management relations, and spending money on damage compensation expenses (Kim & Park, 2021). Thus, companies investing in a positive work environment would have fewer productivity problems, resulting in increased sales growth and fostering employee productivity.

The significance of our study extends beyond academic curiosity. It has the potential to provide actionable insights for organizations seeking to enhance productivity while maintaining a safe work environment. Given this backdrop, there is a compelling imperative to delve deeper into the concept of employee satisfaction with the physical work environment. This encompasses aspects such as environmental design, welfare facilities, work organization, equipment and tools, as well as health and safety measures. Understanding and improving employee satisfaction in these areas can directly influence productivity, thereby benefiting both employees and organizations alike.

### **Theoretical framework**

To guide our investigation, our study draws upon the Job Demands-Resources (JD-R) model. While the model itself does not explicitly mention physical work environment satisfaction, our study integrates this concept into the JD-R by considering the physical work environment as a job resource that influences employee well-being and subsequently productivity (Schaufeli, 2017). In the context of the JD-R model, there are some aspects of the physical work environment that serve as job resources, such as adequate lighting and

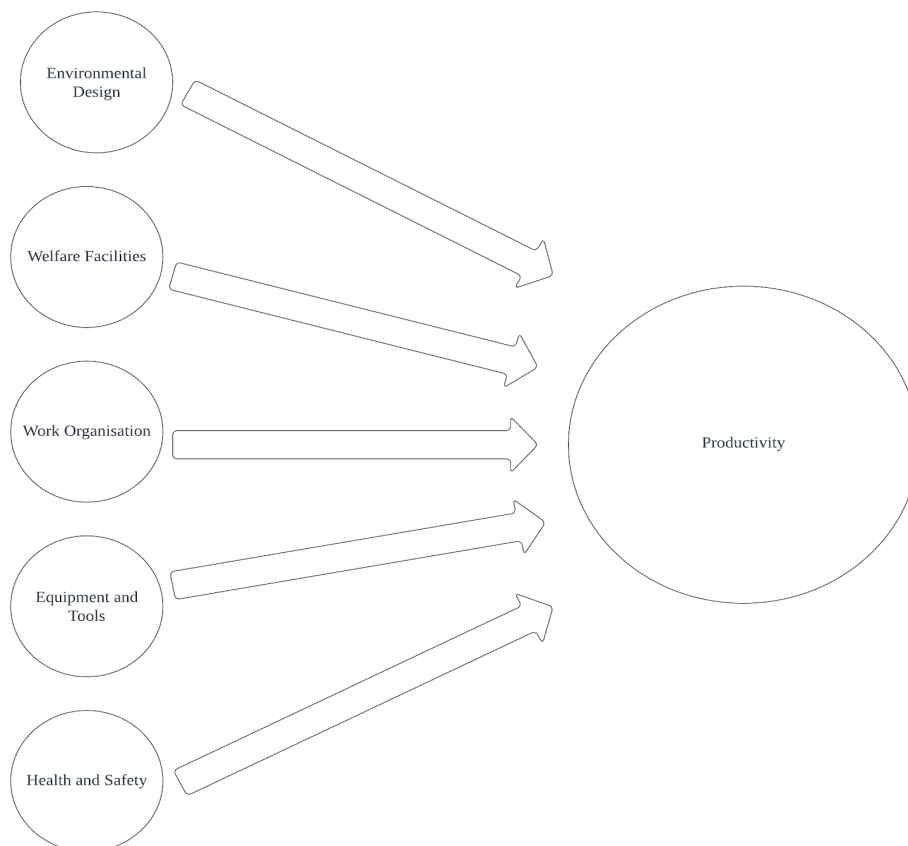
safety measures (Schaufeli, 2017). Our study recognizes individual differences that may affect specific sensitivities to environmental factors, where certain individuals may experience more significant improvements in well-being and productivity (Shamsi et al., 2021). Additionally, the organization’s emphasis on creating a positive work environment can enhance the impact of physical work environment satisfaction on productivity.

In summary, our research aims to comprehensively investigate the intricate relationship between employee satisfaction with specific aspects of the physical work environment and productivity. By delving into these factors and their potential impact on performance, we aim to provide valuable insights for creating more productive and employee-friendly work environments.

Please refer to Figure 1 for the conceptual model, which visualizes the key variables and their interplay in our research.

**Literature review**

*Employee productivity* is defined as an individual's ability to efficiently and effectively complete tasks and fulfill work responsibilities (Afrianty et al., 2022). It is influenced by various aspects of the physical work environment (Hafeez et al., 2019). On the other hand, *workplace environment satisfaction* is defined as the degree to which the workplace environment meets the employee's needs (Van der Voordt, 2004). The physical work environment encompasses the actual work setting, including the design and layout of the workplace, available tools and facilities, lighting, temperature, noise levels, air quality, cleanliness, and safety.



*Figure 1* Conceptual Model

Bauer (2020) found that an increased objective quality of the work environment (i.e., sustainability, diversity, nature, and the availability of spaces for movement and relaxation) increased teamwork and productivity. In an office environment, satisfaction with the physical environment and privacy at work were associated with higher productivity (Haapakangas et al., 2018). Overall, Van der Voordt and Jensen (2021) demonstrated that better workplace design leads to increased employee productivity.

The physical work environment comprises several components, including environmental design, welfare facilities, work organization, equipment and tools, and health and safety. The connection between these components and productivity will be discussed further in the following sections.

### **Environmental Design and Productivity**

The term *environmental design* satisfaction refers to the features and conditions of the workplace environment that meet basic human needs and expectations, such as air quality, lighting, and space utilization, leading to increased productivity (Samani et al., 2018). Lu et al. (2020) showed that improving the illumination of the work environment helps to enhance light comfort, possibly improving productivity. Additionally, improved indoor air quality in public buildings has been associated with a 19 percent increase in productivity (Asere & Blumberga, 2018). Similarly, Irawan and Sari (2021) found that indoor air quality in an office in Indonesia significantly impacted employees' productivity. Recent evidence on the benefits of enhanced indoor air quality in office buildings has shown that better indoor ventilation increases employees' productivity (Šenitková, 2020). Thus, our study proposes the following:

Hypothesis 1: Environmental design predicts the productivity of an employee.

### **Welfare Facilities and Productivity**

According to Patro (2015), *welfare* is defined as a social effort aimed at promoting the physical well-being of people in need, encompassing their emotional, mental, moral, and physical conditions, all of which directly or indirectly impact employee productivity (Islam et al., 2018). Adequate management and organization of welfare facilities play an essential role in promoting better living and working conditions for industrial workers, thereby increasing their productivity (Olcay et al., 2021). The provision of welfare facilities has also shown a positive relationship with the productivity of garment employees (Alam et al., 2020). Therefore, our study proposes the following:

Hypothesis 2: Welfare facilities predict the productivity of an employee.

### **Work Organization and Productivity**

Satisfaction with *work organization* can be defined as satisfaction with how an organization operates and carries out its daily operations. This includes aspects such as work management, organization, and planning within firms, as well as task allocation, work pace, decision-making processes, work design, work processes, and work schedules (Nzuva & Kimanzi, 2022). Budhathoki and Zander (2019) reported that farmers exhibited flexibility in their work, adjusting their pace, taking breaks on exceptionally hot days, rescheduling tasks, wearing wide-brimmed hats, resting in shaded areas, and adopting cooling strategies to mitigate the impact of heat stress on labor productivity loss. Wu and Chen (2020) also found that the increased workload resulting from working from home during the COVID-19 pandemic, coupled with stay-at-home orders, led to a loss of productivity. Based on the literature, our study proposes the following:

Hypothesis 3: Work organizations predict the productivity of an employee.

### **Equipment and Tools and Productivity**

*Work equipment* refers to appliances, apparatus, machinery, tools, or installations intended solely for work and should be maintained and kept in good working condition (Health and Safety Executive, n.d.). In the Malaysian automotive industry, proper maintenance and satisfaction with tools and equipment have been found to lead to higher productivity and lower operating costs (Habidin et al., 2018). In construction projects in Kenya, Kigen et al. (2022) established that the unavailability and inefficiency of tools and equipment are significant predictors of lower labor productivity. Thus, our study proposes the following:

Hypothesis 4: Equipment and tools predict the productivity of an employee.

### **Occupational Health and Safety and Productivity**

*Occupational health and safety* are defined as a science that takes precautions against the risks of work accidents and occupational diseases in the workplace, aiming to provide satisfaction by reducing the possibility of their occurrences (Olcay et al., 2021). According to Gurmu (2019), three significant practices have been found to increase work productivity in construction projects: occupational safety and health policy, health and safety plans, and hazard identification. Katz et al. (2019) have demonstrated that higher levels of workplace health and safety, as well as employees' perceptions of well-being in the work environment, are associated with lower productivity losses. Implementing measures to prevent hazards and managing policies appropriately in manufacturing firms in Nigeria has shown a significant positive effect on employee productivity (Morgan et al., 2021). Therefore, our study proposes the following:

Hypothesis 5: Health and safety predict the productivity of an employee.

### **Method**

#### **Study Design**

A cross-sectional study design was utilized to examine whether environmental design, welfare facilities, work organization, equipment and tools, and health and safety determine employees' productivity.

#### **Participants**

A total of 310 responses were collected, but 57 were excluded for not meeting the inclusion criteria. In the final analysis, 253 responses (53.36% men; 46.64% women) were included, ranging in age from 23 to 62 years ( $M = 39.00$ ,  $SD = 11.45$ ). The participants were full-time employees in Malaysia, with at least one year of working experience and having undergone at least one round of performance appraisal. They were required to have the ability to understand and read English and represented various levels of positions within the company. Participants were recruited through social media platforms using a convenience sampling method.

#### **Measures**

##### ***Brief Instrument to Assess Workers' Productivity during a Working Day (IAPT score)***

The IAPT score (de Menezes & de Paula Xavier, 2018) was used to evaluate workers' productivity throughout a working day. It consisted of 10 items rated on a five-point Likert scale ranging from 0 (Nothing) to 4 (Totally). The items included in the scale assessed aspects such as concentration, efficiency, and overall productivity experienced by the workers within the last two hours. The internal consistency of the measurement was found to be  $\alpha = .80$  after removing four items with poor reliability. The final score is calculated

using the following formula: Productivity Percentage (%) = (Final Score/24) x 100. Higher scores indicate higher levels of productivity.

### ***Physical Work Environment Satisfaction Questionnaire (PWESQ)***

Satisfaction with the physical work environment was measured using a 37-item questionnaire adapted from The Physical Work Environment Satisfaction questionnaire (Carlopio, 1996). The questionnaire utilized a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). A higher score on the PWESQ indicates a higher level of satisfaction with the physical work environment. The PWESQ consists of five subscales:

1. Environmental design: This subscale consists of eight items that assess satisfaction with aspects such as lighting in the work area. Sample items include: 'How satisfied are you with the lighting in your work area?'
2. Welfare facilities: This subscale comprises five items that measure satisfaction with factors like the cleanliness of restrooms/toilets. Sample items include: 'How satisfied are you with the cleanliness of the restrooms/toilets you use?'
3. Work organization: This subscale includes eight items that evaluate satisfaction with factors such as the scheduling of work time. Sample items include: 'How satisfied are you with how your time at work is scheduled?'
4. Equipment and tools: This subscale consists of five items that assess satisfaction with factors such as the availability of tools/machines for work. Sample items include: 'How satisfied are you with the number of tools/machines you have to work with?'
5. Health and safety: This subscale comprises 11 items that measure satisfaction with factors such as

accident prevention at work. Sample items include: 'How satisfied are you with how accidents are avoided at work?'

The PWESQ demonstrated good reliability for each subscale, with Cronbach's alpha values ranging from  $\alpha = .88$  to  $.95$ .

### **Procedure**

Ethical approval was obtained from the Ethics Committee. Data were collected through an online questionnaire using Google Forms. The survey link was distributed to participants through social media platforms including WhatsApp, Instagram, and Facebook. The survey consisted of a participant information sheet, a consent question, demographic questions, and two questionnaires: the IAPT and PWESQ.

### **Data Analysis**

The data were analyzed using IBM SPSS Statistics 27 software. A standard multiple regression analysis was conducted to examine whether environmental design, welfare facilities, work organization, equipment and tools, and health and safety collectively predicted employee productivity.

## **Results**

### **Preliminary Analyses**

Kolmogorov-Smirnov test indicated that scores for productivity,  $D(253) = .102$ ,  $p < .001$ , environmental design,  $D(253) = .081$ ,  $p < .001$ ; welfare facilities,  $D(253) = .114$ ,  $p < .001$ ; work organization,  $D(253) = .105$ ,  $p < .001$ ; equipment and tools,  $D(253) = .161$ ,  $p < .001$ , as well as health and safety,  $D(253) = .101$ ,  $p < .001$  violated the normality assumptions. However, based on Histogram and Q-Q plot, the distribution of data can be considered as normally distributed. Multicollinearity does not exist

as the predictors had Pearson’s *r* values of less than .70 (See Table 1).

*Table 1*  
Means, Standard Deviations, Internal Reliability, and Pearson’s Correlations

Variables	<i>M</i>	<i>SD</i>	$\alpha$	1	2	3	4	5
1. Total	57.63	14.23	.80					
Productivity	28.96	5.31	.90					
2. Environmental				.336***				
Design	16.79	3.91	.88					
3. Welfare	27.15	5.60	.89	.231***	.645***			
Facilities								
4. Work	17.31	3.64	.94	.332***	.451***	.410***		
Organization								
5. Equipment and	39.90	7.92	.95	.349***	.421***	.434***	.511***	
Tools								
6. Health and				.309***	.530***	.457***	.527***	.451***
Safety								

*Note.* *M* = Mean; *SD* = Standard Deviation;  $\alpha$  = Cronbach’s alpha coefficient; \*\*\**p* < .001 (2-tailed).

**Hypotheses testing**

A multiple regression analysis was performed to assess the proportion of employee productivity that could be explained by environmental design, welfare facilities, work organization, equipment and tools, and health and safety. In combination, these variables accounted for 18.6% of the variability in employee productivity (*R* = .431, *R*<sup>2</sup> = .186, adjusted *R*<sup>2</sup> = .169, *F*(5, 247) = 11.285, *p* < .001). However, only two (environmental design,  $\beta$  = .199, *p* = .015 and equipment and tools,  $\beta$  = .194, *p* = .007) out of the five predictors individually predict productivity when looked at together (See Table 2). It can be concluded that only environmental design and equipment and tools are individually making a significant unique contribution to employee productivity. Therefore, our study supported hypotheses 1 and 4, but does not support hypotheses 2, 3 and 5.

**Additional analyses**

Simple linear regressions were performed and found that Welfare facilities significantly accounted for 5% of the variability in employee productivity (*R* = .231, *R*<sup>2</sup> = .054, adjusted *R*<sup>2</sup> = .050, *F*(1, 251) = 14.199, *p* < .001). Work organization significantly accounted for 11% of the variability in employee productivity (*R* = .332, *R*<sup>2</sup> = .110, adjusted *R*<sup>2</sup> = .106, *F*(1, 251) = 30.991, *p* < .001). In addition, Health and safety significantly accounted for 9% of the variability in employee productivity (*R* = .309, *R*<sup>2</sup> = .096, adjusted *R*<sup>2</sup> = .092, *F*(1, 251) = 26.565, *p* < .001).

**Discussion**

Our study investigated the influence of employee satisfaction with the physical work environment, including environmental design, welfare facilities, work organization, equipment and tools, and health and safety, on their productivity.

Table 2  
Standard Multiple Regressions on Variables Predicting Productivity (N = 253)

Variables	B	SE	$\beta$	t	p	95% CI	
						LL	UL
Constant	18.721	5.352	-	3.498	<.001	8.180	29.262
Environmental Design	.533	.217	.199	2.453	.015	.105	.961
Welfare Facilities	-.259	.284	-.071	-.914	.362	-.819	.300
Work Organization	.329	.187	.129	1.759	.080	-.039	.697
Equipment and Tools	.758	.277	.194	2.733	.007	.212	1.304
Health and Safety	.145	.134	.081	1.081	.281	-.119	.409

Note.  $R^2 = .186$ ; adjusted  $R^2 = .169$ . SE = standard error of the estimate;  $\beta$  = standardized regression coefficient; t = t-statistic for the predictor variable; p = significance level; LL = lower limit; UL = upper limit

As hypothesized, our study found that satisfaction with environmental design significantly predicts employee productivity. Specifically, an increase in employee satisfaction with environmental design was found to lead to higher productivity.

Our result aligns with the assertion by Lu et al. (2020) that improving the illumination of the work environment helps to enhance light comfort, possibly improving productivity. Furthermore, Irawan and Sari (2021) revealed a significant relationship between indoor air quality (another aspect of environmental design) and employee productivity in an office in Indonesia. Improved lighting and air quality may contribute to clearer visibility of tasks and better breathing, thereby increasing oxygen intake and subsequently enhancing productivity. Appropriate lighting has been shown to have positive effects on employees' visual and cognitive processes, leading to improved mood, motivation, and overall well-being (Konstantzos et al., 2020). Additionally, better air quality has been found to reduce illness and sick leave and increase the productivity of office work by 1.5% (Wargocki, 2019). Maintaining a healthy indoor environment is crucial for organizations to enhance the well-being and productivity of their employees.

As hypothesized, our study also found that satisfaction with equipment and tools predicts employee productivity.

Our finding is consistent with Habidin et al. (2018), who concluded that proper maintenance and satisfaction with tools and equipment lead to higher productivity and lower operating costs. It is also aligned with Kigen et al. (2022), who established that tools and equipment have to be available and efficient for employees to be productive. Furthermore, Zubair et al. (2021) reported that Overall Equipment Effectiveness in the pharmaceutical industry reduced machine breakdowns from 31 hours to 29 hours, resulting in increased production. The availability of better and more efficient equipment and tools allows employees to work faster and more efficiently. This is supported by Javaid et al. (2021), who highlighted the utilization of robotics to revolutionize the way companies distribute, improve, and manufacture their products. Robotics can improve the efficiency and productivity of industrial processes by automating repetitive and labor-intensive tasks, leading to increased production accuracy and speed. With the implementation of robotics, employees can work faster and more efficiently, completing more tasks in a shorter period of time, resulting in cost



savings for the organization and increased competitiveness in the market.

Contrary to previous studies (e.g., Alam et al., 2020; Morgan et al., 2021; Nabawanuka & Ekmekcioglu, 2022), our study failed to establish satisfaction with welfare facilities, work organization, and health and safety as significant predictors of employee productivity.

There are several explanations for these differences. Firstly, previous studies that have found a relationship between welfare facilities, work organization, and health and safety with employee productivity did not include the work environment and tools and equipment as predictors. That is, Alam et al. (2021) only looked at welfare facilities, Nabawanuka and Ekmekcioglu (2022) only examined the influence of work-life balance (an aspect of work organization), and Morgan et al. (2021) solely focused on health and safety policy management and how they ultimately influenced productivity. Thus, it is possible that they have overestimated the roles of those variables in predicting employee productivity in the absence of the work environment and tools and equipment. This is confirmed by an additional analysis that our study has conducted, which found that the three variables significantly predict employee productivity when analyzed individually with simple linear regressions.

Secondly, culture may play a role in explaining the differences in findings. Previous studies that supported the link between welfare facilities, work organization, and health and safety with employee productivity were conducted outside of Malaysia (i.e., Bangladesh, Nigeria, Turkey), where Southeast Asian culture is not the prominent practice adopted. Bakas et al. (2020) found differences in labor productivity based on the culture of 34 members of the Organization for Economic Cooperation and Development (OECD), including

Turkey. Although Malaysia is not a part of the OECD, if there are differences in productivity with countries within the same region of the world (i.e., Europe), it will not be surprising if more significant differences exist in countries located in different regions (i.e., Africa, Europe, Asia).

### **Limitations, Future Research, and Implications**

Our study has two limitations. First, we utilized a cross-sectional design, which limits our ability to establish causal relationships between variables. It is important to note that there may be other factors, such as work motivation and job satisfaction, that could influence employees' productivity and were not accounted for in our study. The physical work environment factors included in our study explained only a relatively small amount of the variance in employee productivity, indicating the possibility of additional factors that were not considered.

For instance, Abdulkhaliq and Mohammadali (2019) assert that work motivation, influenced by factors such as job design, opportunities for growth and development, and recognition, can impact employee productivity. Additionally, job satisfaction plays a significant role in employee performance, as satisfied employees are more likely to be motivated to perform well, leading to increased productivity and better job performance. Therefore, employers should recognize that, apart from physical work environment factors, other factors such as work motivation and job satisfaction should be considered when developing strategies to improve employee productivity.

Further research should consider incorporating a longitudinal or experimental design and exploring other relevant factors to provide a more comprehensive understanding of the relationship between the physical work environment and employee productivity.

Second, the present study utilized a self-reported survey approach, which may be susceptible to social desirability bias. This bias can potentially distort the accuracy of the findings by eliciting untruthful responses (Zerbe & Paulhus, 1987). Hence, future investigations may benefit from incorporating a Social Desirability Scale to identify and eliminate participants who are more likely to exhibit this type of bias. By doing so, the precision and reliability of the results can be enhanced.

Despite these limitations, the results of our study highlight the importance, albeit to a minimal extent, of the physical work environment on employee productivity. Therefore, organizations are encouraged to prioritize and, if possible, enhance employee satisfaction with the physical work environment, particularly focusing on aspects such as environmental design and equipment and tools, in order to boost productivity.

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