



The Promises and Challenges of Google Nest Hub Integration in Cilegon Hotels using Theory of Acceptance & Use of Technology (UTAUT)

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

This study explores the potential integration of Google Nest Hub in hotels across Cilegon. By investigating both the promises and challenges, this research aims to evaluate how this technology could streamline hotel operations, improve guest satisfaction, and contribute to the region's hospitality competitiveness. Using qualitative methods, interviews, surveys and observation with hotel managers, staff, and guests were conducted to gather data. Unified Theory of Acceptance and Use of Technology (UTAUT) served as the framework for this research, providing a structured approach to understand the technology adoption based on four dimensions, Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions. Key findings highlight

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that while the device offers seamless integration with room controls and personalized guest interactions, challenges such as sudden updates that cause error, email management and personal preferences to not use Google Nest Hub must be addressed for successful implementation. Limitations include a small sample size, constrained staff perspectives due to departmental focus and voluntary guest participation. This research offers insights into integrating IoT technology like Google Nest Hub in hotels while serving as a reference for other hotels in integrating other smart hubs and paving ways for future studies such as guest satisfactions or comparative studies.

Keywords: Google Nest Hub; Hotel; Cilegon; UTAUT model; Promises; Challenges.

1. INTRODUCTION

As the world is entering Industry 5.0, every section of the industries started to focus on integrating smart technologies into their work, even their personal lives. Industry 5.0 emphasizes humanistic values by integrating human creativity and decision-making capabilities with the precision and artificial intelligence of machines, thereby fostering a collaborative ecosystem (Leng et al., 2022). On the contrary of Industry 4.0, which focuses on the economic aspect of sustainability, Industry 5.0 emphasizes human centricity and societal needs. One of the important key technologies in Industry 5.0 is Internet of Things (IoT).

Internet of Things is a concept that expands the advantages of interconnected networks which allows machines, equipment or other physical objects to connect with network sensors and actuators to gather and analyze performance data, allowing machines to perform based on the data gathered (Istiana et al., 2022). In a sense, IoT allows the objects that are connected in one space to communicate and work together to perform actions.

Referring to the data provided by Statista (2024) in Table 1, the total number of Internet of Things (IoT) connections in SouthEast Asia per 2024 reaches 436.1 million with Indonesia contributing approximately 47.83% or around 208.6 million. Whereas compared to South Korea or Japan, they have reached 411.6 million and 1.055,3 million. Greater China has a staggering 6,433.66 million IoT connections. Region like India and the Middle East also surpasses Indonesia in IoT connections (Siahaan et al., 2023; Vailshery et al., 2024). This indicates a huge gap between Indonesia and other regions which shows the lack of urgency in adopting this technology.

According to recent studies, coming second to the health industry in adapting Internet of Things is the hospitality industry (Buhalis et al., 2022).

Many hotels around the globe have adopted Internet of Things, such as Sinclair (Marriott) with their Savvy Smart Mirror, Viceroy L'Ermitage Beverly Hills with their smartwatch and many more. All those technologies are used to enhance guests' experiences and contribute to cost reduction, productivity, inventory and supply management as well as support sustainability (Ghosh et al., 2023). In Indonesia, Internet of Things (IoT) has begun to make its way into the hospitality industry. In hotels, Internet of Things can be in several forms such as robot waitresses like Mano in Pullman, chatbots, automated check-in and check out systems and Google Nest Hub (Sharma et al., 2021; Asmoro et al., 2023).

Despite the low rate of adaptation of IoT, this specific hotel chain in Cilegon successfully and is known for its IoT integration in the form of Google Nest Hub. Aston Cilegon Boutique Hotel is a 4 star hotel that integrates Google Nest Hub technology in all of their rooms. The integration was initially driven by the need for contactless solutions during the COVID-19 to prevent the transfers of virus from using shared surfaces like switches or buttons. Being the first of it kinds to provide Google Nest Hub in all the rooms, Aston Cilegon Boutique Hotel aims to provide hospitality through the help of technology and eliminates the need of touching critical surfaces at the same time paying attention to style and sophistication while including the newest technology into the blend to provide the highest experience for the guests in a safe and clean environment (Archipelago, 2024).

With that being said, Google Nest Hub is a smart display with a touchscreen, allowing users to control features with Google Assistant by voice commands or by touching the screen under the brand of Google Nest, a line of smart devices from Google, formally known as Google Home (Marikyan et al., 2022). The usage of Google Nest Hub in the hotel industry is relatively new, particularly in Indonesia with Aston Cilegon

Boutique Hotel being the first in its adoption. The initial implementation of Google Nest Hub itself was driven to find contactless solutions during Covid-19. The Google Nest Hub provided the solutions in Aston Cilegon Boutique Hotel with the built in Google Assistant which uses voice activations, boosting the guest experience while following the health protocols. Like other electronic devices, Google Nest Hub also has the potential to be flammable if exposed to heat and placed not according to the instructions given (Suharto et al., 2024).

Given the potentials and risks, it is important for hotels to assess the use of this technology. To better understand what Google Nest Hub can bring to the hotel, a framework that evaluates the technology adoption is required. Unified Theory of Acceptance and Use of Technology by Xu et al., (2021). According to (Chen et al., 2022), Industry 5.0 is the power of industry that becomes an act of prosperity and reaches societal objectives by making production aligned with the respect of the planet and the wellbeing of workers .

This research explores further more regarding the promises and challenges of Google Nest Hub integration in hotels in Cilegon, specifically Aston Cilegon Boutique Hotel.

2. LITERATURE REVIEW

2.1 Industry 5.0

Industry 5.0 emphasizes humanistic values by integrating human creativity and decision-making capabilities with the precision and artificial intelligence of machines, thereby fostering a collaborative ecosystem (Leng et al., 2022). According to (Chen et al., 2022), Industry 5.0 is the power of industry that becomes an act of prosperity and reaches societal objectives by making production aligned with the respect of the planet and the wellbeing of workers ..

2.2 Internet of Things (IoT)

Defined by (Istiana et al., 2022), Internet of Things is a concept that expands the advantages of interconnected networks which allows machines, equipment or other physical objects to connect with network sensors and actuators to gather and analyze performance data, allowing machines to perform based on the data gathered. Essentially, Internet of Things have the ability to control even monitor several devices

or appliances that can receive, send and even 'communicate' with other devices in one central location (Google Nest Hub, 2024).

2.3 Unified Theory of Acceptance and Use of Technology (UTAUT)

Unified Theory of Acceptance and Use of Technology or commonly known as UTAUT by Venkatesh et al explains how individuals adopt technology by focusing on four key performance expectancy, effort expectancy, social influence and facilitating conditions (Marikyan et al., 2022). In 2003, Venkatesh et al decided to unify several theories related to technology acceptance with different roots to embrace those variables, disciplines and perspectives so that it can be applied to any context related with technology acceptance thus providing a better understanding on how an individual accepts a technology (Ivanova et al., 2022).

- 1) Performance Expectancy, is the level of which an individual believes that by utilizing the system may contribute a positive impact to the job performance. In this research, performance expectancy can be analyzed by the evaluation of Aston Cilegon Boutique Hotel staff regarding how the Google Nest Hub improves and boosts their performance, efficiency and service quality.
- 2) Effort Expectancy, is the level of ease of an individual in using the system. In this research, this dimension can be analyzed by evaluating the usability and intuitiveness of Google Nest Hub, how easy and comfortable to use from the hotel staffs' point of view.
- 3) Social Influence, is the level of which the individual thinks close persons believe he or she should adopt and use the system. In this research, social influence can be assessed through the staff's opinions regarding the implementation of Google Nest Hub in Aston Cilegon Boutique Hotel.
- 4) Facilitating Conditions, is the level at which an individual believes that there are structures or conditions to help facilitate the system. In this research, this dimension can be analyzed by investigating whether Aston Cilegon Boutique Hotel provides sufficient resources in training or support as well as troubleshooting resources to counter any problem that arises.

Table 1. Comparison of IoT devices connected by region in 2024

Country	Numbers of IoT devices connected (2024)
Southeast Asia	436.100.000
South Korea	411.600.000
Russia and Central Asia	302.500.000
Greater China	6.433.600.000
India and South Asia	330.600.000
Middle East	406.900.000
Japan	1.116.200.000

source: Statista (2024)

2.4 Internet of Things (IoT) in Hospitality Industry

Recent research titled Revolutionizing Hotel Room Comfort: Leveraging Google Nest Intelligent Systems to Improve Guest Experience, discusses how the Google Nest system in hotel rooms has indeed improved guest comfort level, leading to reputation boost (Suharto et al., 2024). This research was conducted by collecting data from several journals related to the Google Nest topic, hence its more general and reflecting to the title the research only focuses on the benefits not including the challenges.

In 2023, there was research conducted by (Shani et al., 2023). This research explored the opportunities and challenges of implementing Internet of Things technologies in the hospitality industry. It discusses Internet of Things in general, meanwhile current research focuses on the specific technology of Google Nest Hub. Furthermore, the scope of this previous research is around the hospitality industry, not just a specific hotel.

In China, a study on how Internet of Things has been integrated into the hospitality industry titled, Overviews of Internet of Things Applications in China's Hospitality Industry (2022). Their study analyzed the operational efficiency and other benefits of IoT in hotels, while the current research is more specific on the IoT technology, the Google Nest Hub, (2024).

Another research that is relevant to the current research is titled Analyzing IOT Automation Facilities in Hotel Rooms: Enhancing Guest Experience and Operational Efficiency by (Ghosh et al., 2023). This research analyzes the usage of Internet of Things in hotel rooms. The difference is again, it does not research about specific technologies and more about guest experience operational efficiency.

According to an article titled Speech Technology in Travel and Hospitality: Voice brings concierge service to bookings and hotel stays, hotels all over the world especially big chains have started to use Voice Assistant (VA) to fulfill guests inquiries whether regarding amenities, reservations or even room controls (Britt et al., 2023). This voice assistant technology is also one of the technologies integrated in the Google Nest Hub called Google Assistant.

Another recent research by Angkasa, Oktavio and Widjayadne, explored the effect of Internet of Things and experience on guests' revisit intention of Aston Inn Jemursari. Although this research mentioned Google Nest Hub and also done in one of Aston hotels, it only focused on the revisit intention and used quantitative methods (Angkasa et al., 2023).

2.5 Unified Theory of Acceptance and Use of Technology (Unified Theory of Acceptance and Use of Technology (UTAUT) in Hospitality Industry

In a study regarding the assessment of how perceived trust and customer satisfaction affects revisit intention to 4 and 5 stars hotels in Malaysia using the Unified Theory of Acceptance and Use of Technology (UTAUT) model (Shahrilet al., 2022). Their research showed how modern technology has an impact on guest experience through 4 dimensions of the Unified Theory of Acceptance and Use of Technology (UTAUT) model. The difference between previous and this current research is the focus. Instead of revisiting intentions, current research focuses on finding the promises and challenges of implementing Google Nest Hub in hotel rooms, specifically in Cilegon.

In 2020, a research based on the Unified Theory of Acceptance and Use of Technology (UTAUT) model to find out customers' acceptance of self-

service technology in food and beverage scope. Although both studies are in the scope of the hospitality industry, previous research put focus on the restaurant service while current research focuses on hotel services hence creating difference analysis on different technology (Jeon et al., 2020).

3. METHODOLOGY

This research is done using qualitative methods. Qualitative research is the study of problems of social or human problems through the use of theoretical frameworks or interpretives by addressing the meaning of individuals or groups (Creswell et al., 2018). To gather the data, this research uses interviews and observation through purposive sampling and analyzed using methodological triangulation. Interviews can be understood as a dynamic process where a specific information is gained from a respondent by a researcher through several questions (Dursun et al., 2023). In this research, observation serves as a tool to watch and record behaviors of an object to capture details or informations as it happens to gather insights about the implementation of Google Nest Hub (Kumar et al., 2023)

One of the triangulation methods is methodological triangulation which according to (Haryoko et al., 2020) based on Denzin is a procedure to check the data gathered using different methods to draw reliable data and the aim is to lower the probability of biases that can accumulate from one method.

Purposive sampling is used in this research, is a decisive sampling technique in which the subject of the research is decided based on a few criteria that is related to the research, in this case, the manager, staff and guests of Aston Cilegon Boutique Hotel (Ani et al., 2021). To further enhance the representativeness of the sample, stratified random sampling is applied as it is a sampling technique that distributes population into several groups and randomly selects the sample from each group (Iliyasu et al., 2021). The sample includes 5 (five) individuals divided among key roles: IT (Information Technology) manager, Front Desk manager and assistant as well as guest feedback from those who have directly interacted with Google Nest Hub. Given the focused scope of the study is within a boutique hotel, this sample size reflects the niche yet valuable insights from relevant stakeholders.

As mentioned above, Unified Theory of Acceptance and Use of Technology is the main framework used to construct interview questions and survey questionnaires for the staff and the guest as it offers more comprehensive indicators to understand what are the promises and challenges of Google Nest Hub integration in Aston Cilegon Boutique Hotel.

4. RESULTS AND DISCUSSION

4.1 Google Nest Hub Integration in Aston Cilegon Boutique Hotel

In these past few years, the trend of using smart technologies has affected the hospitality industry in order to enhance guests' experience and boost operational efficiency. Aston Cilegon Boutique Hotel has distinguished itself as the first boutique hotel in Southeast Asia to integrate Google Nest Hub into all 103 rooms. This reflects its vision to provide hospitality through the help of technology and eliminates the need of touching critical surfaces at the same time paying attention to style and sophistication while including the newest technology into the blend to provide the highest experience for the guests in a safe and clean environment.

Upon interview, the reason why Aston Cilegon Boutique Hotel became the first in the industry to integrate such technology have been divulged by key respondents of Aston Cilegon Boutique Hotel. COVID-19 was the main reason why Google Nest Hub was implemented in the first place. During COVID-19, close range verbal and non-verbal interaction was strictly limited due to the high exposure of risk in the air circulation and surfaces which led to the transmission of the COVID-19 virus. For instance, the traditional telephone in hotel rooms requires the user to pick up the handles and press the buttons for it to work thus increasing the chance of contact with the virus. The usage of Google Nest Hub replaces the hassle of traditional telephone by using voice activation to operate it.

Additionally, they also briefly explained how the Google Nest Hub plays its part in the daily operational structure. The Google Nest Hub in Aston Cilegon Boutique Hotel offers a range of functions purposely designed to enhance guests' experience. Those functions include voice activated room controls, play entertainment like Youtube or Spotify, quick access to the front desk for extra services or assistance, screen

mirroring, even language translations. By providing these functions, the Google Nest Hub not only increases the guests' experience by letting them gain control of their room environments but also streamlines the communication between staff and guests.

Aston Cilegon Boutique Hotel integrates these functions into a one-stop service model, meaning all information is centralized in one department, the front desk. This ensures that all information or services are efficiently coordinated and minimizes the risks of the same information relayed twice that can result in miscommunication. However, this centralization model has contributed to the limited scope of data collection as the main hub is located at the front desk.

Fig. 1. depicted the flow of the usage of Google Nest Hub. When the guest requires assistance from the hotel, they are required to go through and use Google Nest either by voice activation by saying "Ok Google, call the front desk" or press the prepared shortcut to be connected with the staff in the front desk. Once gathered, the information will then be relayed by the front desk staff to the related departments to fulfill those services. This example can be seen when a guest wants to order food delivery services from the Hotel. It started through an interaction from Google Nest, the guests are given a QR code on the display for them to see the menu. After deciding, they can call the front desk to order their selection. Once the information has been received, the front desk staff pass the information to the restaurant to provide and deliver the food and beverage for the guest.

Despite the adaptation of technology in the modern era, some people, particularly older people, are yet to understand the usage and how to operate Google Nest. This is one of the curfews that the Hotel did manage by providing a WhatsApp Business number specifically catered to this needs. WhatsApp is used due to it's largely accepted by the majority of population as it has existed for some time to adapt. Thus, communication of services in the hotel are flexible and catered to each person's comfort level. Respondent front desk Assistant Manager shared that the hotel's guests are predominantly expatriates, businessmen, families and older people for whom this additional support is particularly beneficial.

Google Nest Hub has successfully been integrated into the daily operations of Aston Cilegon Boutique Hotel and through this implementation, it has brought effectiveness beyond its basic functionality. It is essential to understand how well the Google Nest Hub helps the hotel's to meet its operational goals and cater the needs of the guests from the point of view of Aston Cilegon Boutique Hotel staff that interacts with these systems on a daily basis.

Given the lack of direct feedback from the guests due to privacy reasons, the insight provided by staff offers valuable perspectives. By applying Unified Theory of Acceptance and Use of Technology (UTAUT) framework, the analysis of these perspectives across key dimensions including performance expectancy, effort expectancy, social influence and facilitating conditions can help to achieve better understanding regarding the effectiveness of Google Nest Hub and its integration into hotel's service model.

4.2 Performance Expectancy

Performance expectancy refers to how much an individual thinks that using the system can help them to enhance their job performance. At Aston Cilegon Boutique Hotel, staff members perceive the Google Nest Hub as a valuable tool to boost their efficiency during daily operations. For example, a key respondent noted "One of the functions of Google Nest Hub is that it can be controlled from a distance, so we (staff) can add a gallery for guest special occasions and promotional flyers directly to the device." In other words, Google Nest Hub allows staff to perform flexibly and effectively without needing to be physically present and also giving real-time information access to the guests.

Additionally, the Google Nest Hub is also deemed useful as it has the capability to show the room number when the guest contacts the front desk for assistance. Furthermore, it reduces wait times by ensuring all the requests are directed to related departments as fast as possible resulting in more efficient service. Apart from that, sudden updates from the system itself can cause problems. Some updates can result in error, thus the Google Nest Hub cannot operate to its full potential but when that happens, guests can use Whatsapp to communicate with the front desk and the other devices like TV in the room can be controlled using remote.

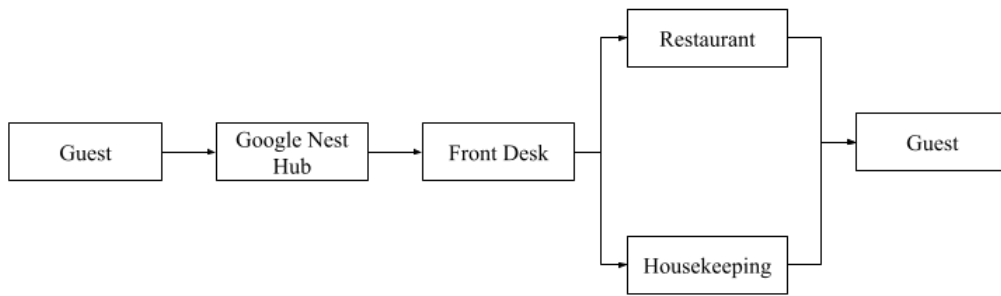


Fig. 1. Google nest hub integration in Aston Cilegon flowchart

source: Author's own work

Overall, the Google Nests Hub contributes to the efficiency of daily operations by improving staff productivity, enabling quicker and more accurate service delivery and giving more responsive guests experience despite some errors caused by sudden updates, this matches the general concept of Performance Expectancy, where the technology helps in boosting productivity and service quality despite with limitations of the system.

4.3 Effort Expectancy

Effort expectancy refers to how user friendly the system is. According to information gathered through survey and interview, One staff member was already familiar with the system from home use, and found it straightforward to use. Other staff, who are introduced to the system by hands-on demonstration, also noted that it is quite easy to use as the interface only consists of several options. As Google Nest Hub can be controlled from a distance, it simplifies staff workflow. For example, before implementing Google

Nest Hub, the staff had to manually store and plug the flash disk into the room TV beforehand when displaying pictures for guests on special occasions.

While Google Nest Hub has a translation function, the system primarily supports English which could pose difficulties for non-English speakers. The translation function may not be able to cover all context of the conversation which can cause difficulties or even miscommunication if the translation is not accurate. Furthermore, while it was easy for the younger generations to operate Google Nest Hub, older people tend to find it difficult to operate the device despite the given manual. When this issue occurs, the staff will direct them to use Whatsapp to communicate with the staff.

Another difficulty noted by key respondents is regarding email management. Since every Google Nest Hub in Aston Cilegon Boutique Hotel room uses a personal email account that was made to create a unique ecosystem for managing room functions and content, the recent Google policies had made it difficult to create new emails. This policy is made to prevent people from creating fake accounts to misuse Google's services (Hatchett 2024). This issue complicates the setup and system maintenance, as staff must find a way to create an email account without it getting blocked by Google. This shows that while the Google Nest Hub is largely intuitive, certain complexities still exists

4.4 Social Influences

Social influence refers to how an individual perceives the close persons believe the individual should adopt and use the system. With the evolution of technology, more people have adopted and use the technology to help their daily lives. Hence, this contributes in affecting the perceived belief of an individual in using the technology as well from close persons. Moreover, as quoted from the key respondent upon interview, "technology is everlasting and keeps on evolving." This perspective emphasizes the importance of staying current with technological advancements, especially in the hospitality industry where the goal is to deliver service excellence and provide the best guest experience.

In Aston Cilegon Boutique Hotel, this belief is reflected in the staff's daily operation with Google Nest Hub as they are encouraged to embrace new technology to align with the modern industry standards and hotel's vision.

Despite the positive influence, the research also reveals some mixed responses of guests that

were informed through the staff. Some guests prefer using Whatsapp rather than Google Nest Hub due to their lack of experience in using it which causes inconveniences. This indicates that while social influences from management and industry trends drive staff to adoption, individual preferences still play a significant role.

4.5 Facilitating Conditions

Facilitating conditions refer to the conditions or structures that facilitate the usage of the system. One of the biggest facilitating factors that may influence the effort to use Google Nest Hub with ease is the internet connection stability. Internet connection is the main source to facilitate the communication travels within the system which eventually will go back to the guests. Google Nest Hub relies on good connectivity in order for it to operate fully. However, with slow internet connection or unstable internet connection, this may lead to a jam in the communication delivery process and poor performance. Although this issue rarely happens, Aston Cilegon Boutique Hotel was fully prepared by providing two Wi-Fi servers, one as main and the other serving as a backup.

Noted by the respondent, the Google Nest Hub can have sudden updates from the system. While the majority of updates lead to facilitating a better system performance for Google Nest Hub, it may cause errors as well during the process, which forces the guest and staff to communicate using Whatsapp. This shows that although it is helpful, Google Nest Hub can also be a problem on daily operations.

5. CONCLUSION

From this research, it can be concluded that Google Nest Hub integration in Aston Cilegon Boutique Hotel brings numerous benefits. Within the Unified Theory of Acceptance and Use of Technology (UTAUT) Framework, it has helped in improving the job performance by providing efficient and flexible service without needing staff to be physically present. Furthermore, with the adaptation of technologies, Google Nest Hub with an easy user interface has helped in the effort and the social influence on using it. To facilitate the Google Nest Hub, strong internet connection and major updates are vital for this technology. Despite the benefit it imposes, there are certain challenges as well. As for now, Google Nest Hub only supports the English language which may pose a language barrier for

non-English speakers. Due to each Google Nest Hub requiring an email account to control devices in the room, the new policies from Google has made it difficult to create several emails without getting blocked by the system. Older generation also prefers using Whatsapp to communicate with the staff as it is much more convenient than Google Nest Hub. Lastly, sudden updates from the system can pose a challenge, as it can result in an error.

To uncover Google Nest Hub full potential in Aston Cilegon Boutique Hotel, these challenges must be addressed. Regarding support language and preference of using Whatsapp, Aston Cilegon Boutique Hotel should do more marketing regarding the existence of this technology in their hotel by using demonstration video, so that the guests can recognise and be familiar with this device thus increasing the chances of usage. As for sudden updates, the Information Technology or IT team can do routine checks regarding the devices systems to anticipate the updates, contacting Google Support regarding this matter is highly advisable since the updates are from Google itself.

This research provides valuable insights regarding the integration of one Internet of Things (IoT) technology, Google Nest Hub in the hospitality industry at the same time, opening new research opportunities such as guest satisfaction and experience regarding smart technologies in the hospitality industry, or comparison studies of different smart hubs in the hospitality industry. Several limitations in this research include small sample size as Aston Cilegon is a boutique hotel with limited staff and guest participation. This also restricts the scope of staff perspectives as the only division that interacts directly with Google Nest Hub are the Front Desk and Information Technology (IT). Additionally, guest participation was voluntary and not all willing to take part thus, narrowing the data pool.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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