

Integration of System Engineering for Enhancing Feline Care and Customer Satisfaction: Key Takeaways for Cat Hotel Model

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Abstract

The popularity of cat as a household pet has pointed many new development of products and services. In particular (especially during the COVID-19 pandemic), there has been a significant business growth in a cat hotel industry. Even when the severity of the COVID-19 pandemic becomes less, the demands for cat care services have not been diminished. Many cat owners, faced with business trips which require them to be away from home, often have to deal with this challenge by asking neighbours for shelter. Despite some availability for private shelters to look after their cats, the level of quality and satisfaction has been an issue. As a result, this study aims to apply the concept of systems engineering (which focuses on functionality, quality, usability, maintainability, and supportability) to design and propose a model for a cat hotel. In addition to the needs of cat owners, this study closely examines many relevant cat-related issues such as behavioural needs, sensory capabilities, potential stress, and hygienic environment. The conceptual model for a cat hotel includes specialized accommodations, comprehensive support systems, emergency protocols, and environmental management strategies. The research contributes valuable insights for developing superior feline accommodation facilities that balance technical requirements with economic considerations while ensuring optimal care for cats and peace of mind for their owners.

Keywords: Cat hotel, cat behavioural need, system engineering, service quality

1 INTRODUCTION

Cats have become increasingly popular as indoor pets worldwide due to their personality traits and attractive physical characteristics. They provide invaluable companionship, particularly for people

living alone or those seeking relief from the stress of full-time work, offering unconditional love that serves as a natural remedy for fatigue to humans. Cats began their unique relationship with humans for very long times ago (Alley Cat Allies, n.d.). Moreover, there are many of history of cat regard to the religious belief in many countries, as well as in Thailand.

The number of cat populations are significantly increasing year on year all around the world, especially during the notable surge of Covid-19 pandemic outbreak (World Population Review, 2024) which people is forced to quarantine in the restrict area resulted to many people sought emotional comfort through pet companionship. This trend has led to a widespread phenomenon of pet humanization, where cats are increasingly treated as family members rather than mere pets. This shift in perception has stimulated significant growth across the pet care industry.

Even though, cat can undoubtedly bring the comfort emotional to the people. However, cat owners still encounter and struggle with many specific challenges. There are many countries in Asia reported the specific problem toward raising pet in home such as home get messy, often need to clean up urine and stool, getting dirty on clothes, taking care of pet while unwell, or even hard to leave from their home for long period of time (Dataspring, 2023).

Recently, the one of pet care industry which is signification growth along the raising trend for the cat population is boarding cattery or known as cat hotel business (Linkedin, 2024). The main function of cat hotel is to provide the accommodation, grooming, behavioural training, and recreational activities for cat. However, there are many of customers who have used the cat hotel services consistently report that their needs are not being met, the main reasons are poor care, poor communication, stress occurring, no recreation program, etc. These findings highlight a significant gap between the cat hotel's services and customer expectations.

The researcher has found the opportunity and would like to take this advantage to study of establishing the conceptual model of cat hotel under the excellence care condition, considering of integrating system engineering which will foster the most value to cat hotel business for the propose of mitigation or even elimination entirely related troubles which contributed the cat owner get worried about once having to travel far away and leave their beloved cat alone at the hotel. The integration of the system design activities to be involved in this research including functionality, usability, supportability, safety, maintainability, environmental, and affordability to competence the design in order to achieve the ultimate objective.

2 OBJECTIVE

To develop a comprehensive conceptual cat hotel model which integrates comprehensive cat caring facilities and services to deliver the excellence care prioritized physical health and mental wellbeing of cat, and cat owner satisfaction by integration system engineering to support systems and operational frameworks that optimize cat care services.

3 SCOPE

- This hotel facility is exclusively designed to accommodate cat only.
- The comprehensive services included accommodation, day-care, and grooming.
- The hotel do not allow sick cat for accommodating.

- The hotel do not allow unvaccinated cat for accommodating.

4 LITERATURE REVIEW

A history of the unique relationship between cat and human began around 10,000 to 12,000 years ago (Alley Cat Allies, n.d.). Once human established permanent settlements in the city, cats are used to hunt rodents that threatened stored food and grain, then people domesticated from wild cat to become indoor cat. Throughout history, cats have also held significant positions in various religious beliefs such as sacrificed to Bastet and mummified in Egypt 2,900 years ago (International Cat Care, 2025), as well as in Thailand Siamese cat named Wichien Maat has been kept in royal Thai courts, featured in sacred ceremonies, and even presented as diplomatic gifts (Lakarnchua, 2022). Despite of living in the city, cats still retain characteristics and natural behaviours as their ancestors such as solitary hunter, scope by territory, avoidance of threat, varying degree of sociability, etc. (Taylor et al., 2022). The sensory system of cat including of hearing, smell, vision, touch, and test are the functions for detecting prey, possible threats, and monitoring the potential for an environment to be either beneficial or detrimental to their survival (Taylor et al., 2022). In regard to cat perceived the difference way with the human, leading the emotion feeling of fear, anxiety and frustration that elicit to the stress response (Cummings, 2022) while they are in the novel or unfamiliar conditions and environments (Kessler and Turner (1997)). The key stressors which affected the negative impacted to cats are including of limit the space and restrict movement, change in household routine, territorial intrusion, social conflict with animals or humans, as well as relocation to unfamiliar place (Bradshaw, 2018).

The number of cat populations are significantly increasing, it was reported that currently number is about 600 million around the world (World Population Review, 2024), with a notable surge during and after the COVID-19 pandemic. This shift in perception has stimulated significantly growth across the pet care industry. The one of business which significantly surging is cat hotel, as known as “boarding cattery”, the place which provide the accommodation service for cats, facilitate tourism by allowing cat owners to travel while ensuring their cats are cared for (de Bernardi, Edelheim, & Crossley, 2022). The global trend for the cattery market size continuously increasing. Linkedin (2024) reveals the global cattery market as value approximately \$4.5 billion in 2022 and is anticipated to expand significantly in the coming years. The market is projected to grow at a compound annual growth rate (CAGR) of 6.7% from 2023 to 2028.

The management of service quality helps hotels enhance their overall service delivery and maintain long-term customer relationships (Kalnaovakul & Promsivapallop, 2022). Service quality is totally different from the goods quality as it's depend on the customer's perception (Parasuraman, Zeithaml, & Berry, 1988). SERVQUAL is the prominent instrument generally utilized for come out the result of service quality which including of five attributes: tangible, reliability, responsiveness, assurance and empathy (Zepeng, 2019). However, it could not be adaptation well with hotel industry (Ojo & Majebi, 2018). Therefore, LODGSERV and HOLSERV are developed to use for hotel service industry particularly (Kalnaovakul & Promsivapallop, 2022). Chrissandhi, Pujiyanto, and Damayanti (2023) highlighted the conceptual design of service quality for cat hotel and found that there will have two more attributes which are ethic veterinary and pet safety for cat hotel service quality evaluation.

Customer gap is the discrepancy of customer expectation and their perception of service providing (Shu-Ping, Lu-Fang, & Ya-Hui, 2009), this is an essential affected to the service reputation. There are lots of gap regarding the feedback from customers who use the cat hotel services. The consolidation is

conducted through the social community on a various sources to be represent of the customer complaints for cat hotel service. Ronexea95 (2023) feedbacked about the cat after taking 5-days period stayed in the cat hotel, found that the cat was not eat, drink, using litter box, and play like before went to the hotel. BroadBean66 (2014) complaint on the cat hotel service in which encountered poor service at a cat boarding facility where the owner refused to release their cats without immediate payment, as well as Styles (2021) has written about her cat ran away and missing from the hotel, moreover the hotel was being wrongly putting medication to the cat due to he was mistaken to another cat.

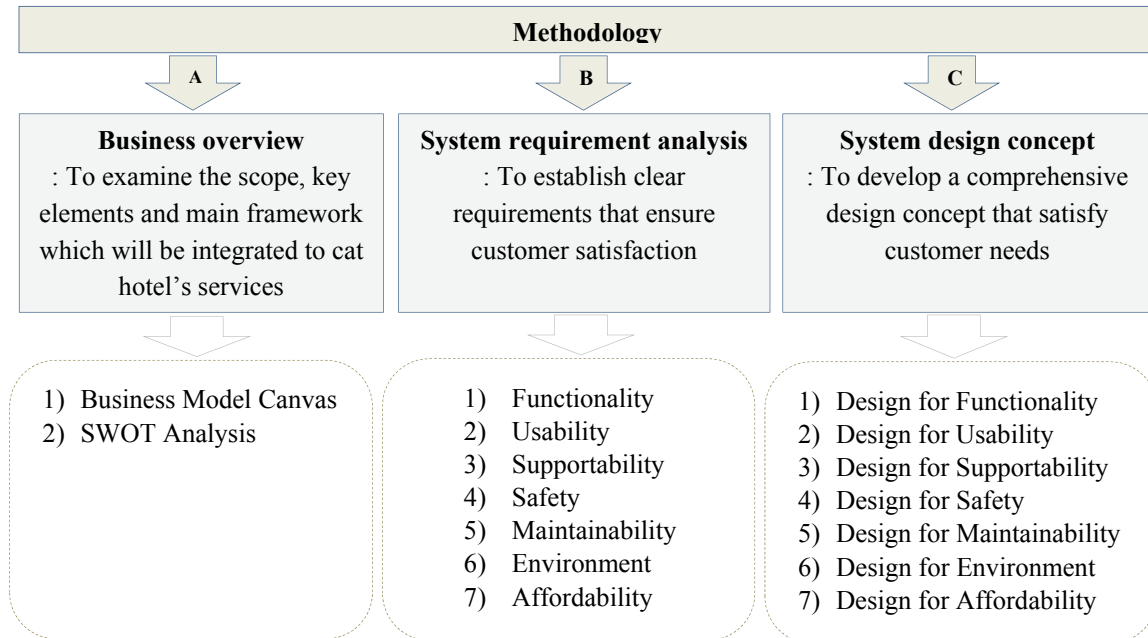
System Engineering (SE) is an interdisciplinary engineering management addresses the three major elements of each system which are hardware, software and human (Department of Defense, 2022). SE consists of two significant disciplines that are technical knowledge domain in which the systems engineering operates, and systems engineering management, integrating three major activities which including development phasing, systems engineering process and life cycle integration. System design requirements vary based on the project specifications and goals. Different types of engineering expertise are needed depending on the system being developed, for simple systems, fewer engineering specialists may be needed. However, complex systems require expertise from many different engineering fields to work together (Blanchard & Blyler, 2016).

Regarding the customer gap toward cat hotel services, this research aims to develop a comprehensive conceptual model of cat hotel that address existing issues by integration of system engineering in the early design stage through the design activities including of including functionality, usability, supportability, safety, maintainability, environmental, and affordability. The study focus on creating the excellence care condition and supportive facilities that cater cat characteristic and behavioural needs while also capable of meeting the cat owner demand.

5 METHODOLOGY

In this research, the part of methodology will be divided into 3 categories: business overview, system requirement analysis and system design concept.

Figure 1: Research methodology overview












5.1 Business Overview

First of all, this research will begin with a comprehensive overview of the cat hotel business model and its integrated supportive systems. The analysis explores the key operational elements, scope, and foundational framework to provide a clear understanding of this specialized hospitality services.

5.1.1 Business Model Canvas

The tool utilized to develop strategic planning by illustrating through the template for the business insight and define the specific risk in every aspect call business model canvas (Score, 2020) will be incorporated for establishing framework and key factors across the three core services: accommodation, day care, and grooming. Through this analysis, we could gain the benefit for our business strategy to achieve business objectives.

Figure 2. Business model canvas for cat hotel

Key Partners -Animal Hospital -Pet taxi agency -Cleaning agency -Animal food shop -Maintenance service -Recruitment Agency 	Key Activities -Reservation management -Customer service -Caretaking service -Day care service -Grooming service -Keep cleaning and hygienic condition -Tracking and information -Environment management  Key Resources -Own capital or bank loan -Employee skill -Quality of partner -Proper design construction -Facility sufficiency 	Value Propositions -Excellence cat care quality: physical health and mental wellbeing -Safety place -Emergency support -Facility support -System support -Best experience for cat and owner 	Customer Relationships -Personnel assistance in need -Social community (by Line app, Facebook or another online channel) -Interacting via website (Q&A)  Channels -Website -Phone call -Application (Line, Facebook, etc.) -Help desk 	Customer Segments -Cat owner who have to travel far away from home -Cat owner who have to go to work aboard -Cat owner who are not available to take care their cat -Cat owner immediately get illness and hospitalize for short or long term. -Cat owner need the related services for cat such as day care, grooming service. 
Cost Structure -Land cost -Construction cost -Decoration cost -Facility cost -Advertising cost -Depreciation cost -Equipment cost -Electricity cost -Loan and Taxes -Wage cost 			Revenue Streams -Room revenue -Day care service revenue -Grooming service revenue 	

5.1.2 SWOT Analysis

SWOT analysis is the tool for strategic planning framework, utilizes to analysis and examine the strengths, weakness, opportunities and threats (Raeburn, 2025). This analysis reveals how concept design and system integration can strengthen and create opportunities for cat hotel businesses. Additionally, the weakness and threat analysis helps identify specific challenges that hotels must address to ensure success.

Table 1. SWOT analysis for cat hotel

Strength	Weakness
-Excellence service providing: The services are integrated for facilitating. As well, the cat owner will be served with the best experience like cat. -Ensuring the wellbeing of cat: The concept design based on the cat behavioural need can be ensure physical health, mental health, as well as extremely safe for the cat. -Integration of support system: The system can either support for operation or in case of emergency happen, the assistance will be taken immediately. -Knowledge and skill of the service provider: All members who will be start working need to match the academic background or pass the specific training in order to provide the best care service to customer.	-High capital investment: Due to the integrating a lot of the systems to facilitating resulted to the capital investment is high. -Uncompetitive service charge: Regarding the high capital investment, service pricing will have to direct varying with the capital investment, leading the service fee higher than the competitor.
Opportunity	Threat
-Cat population increasing: The continuously increasing of cat population in the world from the decade, as well as in Thailand. -Human lifestyle change: Trend of the people to have the pet as a family member nowadays. -The tourism promotion: Both from the government and private sector stimulate tourism, so the cat hotel business can get earning more from the campaign.	-Business competition: There are lots of cat hotel established for several area during this period due to company establishment registration has no restriction for anyone who would like to be a cat hotel owner. -Economic downturn: Regarding the situation of war, and the argument of the great country of the world resulted to the regress of the economic situation, and lead the people more awareness for spending.

5.2 System Requirement Analysis

System Requirements Analysis (SRA) is the fundamental of system engineering which provide the comprehensive technical review process to validate the development understanding of system requirements before proceeding initial design work (Department of Defense, 2001). This study focuses on developing a cat hotel as a small-scale system. The design framework incorporates key operational elements including functionality, usability, supportability, safety, maintainability, environmental considerations, and affordability to establish effective hotel functions and structural elements.

5.2.1 Functionality

The hotel's design and operations are optimized to serve three key stakeholder groups: cats, their owners, and hotel staff, ensuring that all functional requirements align with their specific needs and expectations.

❖ *For Cats*

- Require best caring for cat with comfortable, stress free, hygienic environment, non-disturbance and safe living spaces, as well as food, water, litter and facilities related fundamental elements.
- Enough play areas, enrichment activities, entertainment function to enhance expressing the natural behaviour, together with emergency support in case of critical incidents happening.

❖ *Cat Owners*

- Clear communication channels with easy booking and check-in/out processes.
- Regular updates condition about their cat for the peace of mind.
- Facility support while they are waiting for their cat at the hotel.

❖ *For Hotel Staff*

- Safe workplace with facility to support operation and resting in need.
- Well-defined responsibilities for effectiveness of work, together with proper training programs to enhance the skill of work.

5.2.2 Usability

- Enough space for cat to perform activity and hotel staff to access to work.
- Provide the design to enhance cat's sensory system.

5.2.3 Supportability

- Sufficiency manpower support all activities.
- Support systems for continuity of hotel operation and facilitate customer service.

5.2.4 Safety

- Safety room design to retain the safe place for cat and safety system design to protect cat escape.
- Safety core system integrated to settle with emergency incidents with emergency plan.

5.2.5 *Maintainability*

- The easily of hotel staff to maintain the cleanliness of the hotel.
- Promptly repair for unexpected disruption or damage.
- The continuity operation of support system to avoid hotel closing long-time.

5.2.6 *Environment*

- Indoor hotel areas must be maintained in a consistently clean environment.
- Hotel operations should not generate harmful pollution or negative environmental impact to surrounding areas.

5.2.7 *Affordability*

- The material selection should be durable, with the optimization of cost.
- Cost saving throughout the project's duration.

5.3 **System Design Concept**

5.3.1 *Design for functionality*

The cat hotel's infrastructure integrates multiple specialized functions designed to meet the unique needs of its stakeholders. The facility's design principles are founded on extensive research into feline characteristics and behavioral requirements, while simultaneously incorporating functional elements that serve both cat owners and hotel staff. These design elements ensure optimal care delivery while maintaining operational efficiency and customer satisfaction.

Functionality for cat

(a.) Room function:

- *Room construction:* provide the sufficient area of accommodation, hiding, perching and vertical playing such as boxes, shelves, ladder, cradle, and walkway should be integrated into the interior design in order to encourage cat expressed their natural behaviour (Rochlitz, 1999; Taylor et al., 2022). Additional, hotel design portion to allow staff easily monitor from outside area is needed.
- *Room furnishing:* fundamental elements such as food, water, and litter tray should be adequate for the number of the cats (Rochlitz, 1999). Automatic cat toilet recommend to install in rooms housing multiple cats. Provide sufficiency resting area to avoiding aggressive or fighting. Amenities including fleece blankets and woven or corrugated surfaces for them to reclining (Rochlitz, 1999). Double compartment is recommended to encourage the cleanliness as well this can be adjust to be more flexibility in case of reducing or surging number of cat (Wagner, Hurley, & Stavisky, 2018). Moreover, a variety of cat toys, artificial voice of other animals, the artificial light tone to reduce fear anxiety should be included, as well as IP camera set up for 24/7 surveillance to monitor cats.
- *Cleaning function:* room should always keep clean for the hygienic environment. Material to be used for the construction should be easy for cleaning. Robotic floor cleaning should be considered for the primary cleaning and mopping with pet friendly solution as a secondary cleaning, following by UV lightening for antibacterial and virus. Due to cat do not like

disturbing in their resting area, so all-day cleaning should not be allowed (Taylor et al., 2022). Therefore, the frequency of cleaning should be scheduled minimizing, and it would be better to design the compartment portion which staff can keep the elimination or fill up food and water without entering the room.

(b.) Recreation function

- *Playground area*: enrichment activities and stimulating equipment including the ladder, cradle, box, walkway, and big running wheel should be allocated. The flooring feature anti-slip surfaces and impact-absorbing materials for safety. Additionally, all decorative elements and fixtures would be certified as pet-friendly grade.
- *Outdoor play area*: outdoor playing provide cats with opportunities for exercise and exploration (Rochlitz, 1999; Wagner et al., 2018). The hotel would create a features to secure outdoor area, feline-friendly features and comprehensive safety measures to prevent injuries and ensure optimal temperature and humidity levels, as well as air quality measurements to confirm PM 2.5 particulate levels are within safe limits.¶

(c.) Facility room function

- *Grooming room*: to provide comprehensive care for cat physical health. The utilization of cat-friendly equipment is ultimately necessary, apply fragrance-free or minimally scented shampoos due to cat not prefer strong scents and chemical odours (Taylor et al., 2022). Specialized pet drying oven instead of traditional blow dryers help keeping calm. Water temperature for bathing should be warm enough to make them relaxing and avoid their feeling stress with cold temperature water.
- *First aid room*: facilities include an examination table, comprehensive first aid kits, and a well-stocked supply of basic medications for immediate care are necessary to prepare in place¶ . All hotel staff members must complete comprehensive first aid training for immediately support cat when injury happen, and the procedure first aid guideline should be readiness at the room.

Functionality for cat owner

The comprehensive designs consider to ensure not only cat wellbeing but also for facilitate the cat owner for the good experience of using service. The hotel design consist of the reception area for check in/check out, information providing, request or inquiry, and payment service with diverse payment option. Contact channel available to enhance interaction between the hotel and customer through the various channel of online platform, such as Website, Facebook, Instagram, Tiktok, Whatapp, Line application, or via offline channel as e-mail, traditional phone call should be maintained. Then, waiting area is supposed to be allocated with basic function like ergonomic seating or sofa, restroom facilities, complimentary coffee and tea service, TV, Wi-Fi, charging module for mobile charging support. Finally, parking area to support the cat owner who drive to the hotel by self is needed. The parking area should be ensures sufficient parking capacity, and charging module for EV car should be consider to set up regarding the growth rate of EV car usage for sustainability trend.

Functionality for hotel staff

Hotel staff members are essential personnel who maintain and support various activities of the hotel. Thus, appropriate amenities including of sufficiently necessary tools and equipment to perform their

duties effectively should be provided. In case of the surge capacity workload, hotel should implement automated solutions that enhance operational efficiency such as robotic floor cleaners, automatic feeding and toileting. Safety protections must be incorporated, for example Personal Protective Equipment (PPE) to protect from defensive attacks, as well as comprehensive vaccination program should be taken before work. Training program of cat caring and emergency response should be scheduled for all staff to ensure the appropriate practicing and enhancing the work effectiveness. Finally, the living area for support resting and their activity should be a basic welfare benefit, together with fundamental household appliance for support their activity should be prepared with enough space, as well as complimentary as a remuneration to encourage their work.

5.3.2 Design for usability

Usability design focuses on creating a user-centric environment that prioritizes convenience incorporated four key factors to enhance the cat experience (Blanchard & Blyler, 2016). Accessibility design is crucial for the hotel construction to ensuring spaces and items are easily reachable for cats to let them do any activities, also room's size should allow hotel staff perform their cleaning duties inside efficiently with comfortable. Then, consideration of sensory supportive design to eliminating hazards and using cat-friendly with safe materials for the sensory of touch, classic music or artificial voice of animal like bird for the sensory of hearing, essential catnip oil for the sensory of smelling, as well as the food and snack can treat the cat to be release their stress out during the day.

5.3.3 Design for supportability

The hotel's support system should be comprehensively designed to optimize service quality across all operations. Manpower management incorporated to ensure smooth hotel operations. Hotel may consider to include manager, receptionist, caretaker, housekeeper and advisor to perform task refer to job description. The hiring process may take place by the recruitment agency and candidate's evaluation should be based on their expertise and experience. Supportive systems integration should be integrated to enhance the service quality and provide customer with the alternative options. In this research, we examine the system to be integrated including animal hospital, animal food shop, maintenance service, pet taxi, cleaning agency and recruitment agency to support hotel activities.

5.3.4 Design for safety

¶ Safety approach entirely design ranges from small injury prevention measure to critical life-saving system, with include the security term gathering for consideration. Safety protocols for physical health protection as primary health check, core vaccinations and rabies immunization are performed to prevent the infectious in the hotel. Hotel design as a safety place as non-slippery material and impact-absorbing, pet-friendly grade decoration materials, safety barrier to prevent falling, anti-slippery plate must be considered to prevent the injury, as well as IP camera 24/7 for Real-time monitoring . Then, in term of the Measure for cat life-saving, hotel should consider to set up GPS tracker device which could be able to track the location and also monitor cat health when they get sleep. Finally, emergency support protocols are needed to mitigate the severity of unexpected critical incidents, emergency preparedness plan would be addressed for several critical scenarios as following: utility disruptions (electrical and water), natural disasters (fire and flood), security threats (theft), and health emergencies (epidemic protocols). Furthermore, to maintain regular staff training, update emergency procedures, regular check

supportive systems, maintain communication channels, as well as restoration plan should be establishing to support such that emergency scenarios.

5.3.5 Design for Maintainability

Maintainability design emphasis on easily, efficiently, correctly and economically maintenance process. Easily maintainability consider to minimize the complex design and function in order to easily maintain cleaning with consider use of durable material to extend the utilization lifespan. When utility disruption or facility damaged unpredictably, immediately maintenance action is needed to avoid discontinuity and protect another damage. Maintenance level should be taken into account as first level maintenance at the hotel, as well as maintenance service should always available to response in the urgent time. Furthermore, preventive maintenance should be properly set in order to avoid the operation stop which will direct effect to hotel activity and lead causing trouble to physical health and mental wellbeing of cat. Maintenance schedule carefully designed to optimize facility operations to maintain and extend equipment lifespan.

5.3.6 Design for Environment

This part is direct effect to the physical health and mental wellbeing of all stakeholder of the hotel. The design would separate focusing for hotel's indoor environment and the impact to the outside surrounding area. The environment management is crucial for cat hotel to maintain proper indoor environmental conditions. Temperature and humidity levels as essential operational requirements, adequate air conditioner to maintain room temperature, humidity controller to maintain the proper humidity, additionally the devices such as air purifier, automatic vacuum cleaner, insect trapping device should be provide to protect cats from getting illness. Pollution management must be properly addressed for cat hotel operations, this might be including hair-catching filters for drainage system, solid waste management to prevent stench leaked out to environment.

5.3.7 Design for Affordability

Focusing on the possibility of investment and involves two key aspects that are technical factors and economic factors (Blanchard & Blyler, 2016). In this design, material selection should prioritize durability to minimize the maintenance requirements, reducing long-term replacement and restoration expenses. Additionally, Cost optimization is also crucial for initial capital investment and business viability. Simplifying the design, common design and lower cost material selection are the alternative way of affordability design (Florham Park, Dehoff, & Kronenberg, 2008). In addition, life cycle cost analysis should be applied for comprehensively assessment through this analysis and identify significant cost-saving opportunities to minimise the operational cost while optimizing project expenses and improving operational efficiency with enhancing project performance and longevity (Florham Park et al., 2008; Ristimäki, Säynäjoki, Heinonen, & Junnila, 2013).

6 RESULT AND DISCUSSION

The cat hotel's conceptual model is founded on systematic design principles, Supportive facilities are stem from core requirements then transformed into system design integrated system engineering into construction and operational framework. The Systems are considered to be exceed baseline standards to

ensure superior service quality to customer. The service quality evaluation compare to seven dimensions from Parasuraman et al. (1988) and Chrissandhi et al. (2023) are resulted as following.

1.) *Tangible dimension*: hotel design prioritizes the needs of cat and all stakeholders. Focusing on creating optimal accommodations for cat based on their fundamental characteristics and behavioural needs integrated specialize room functions for enhance caring, indoor and outdoor play area for exercise and enrichment activities, grooming service for hygienic and healthy maintaining, first aid room for support emergency response, with environmental management addressing to maintain cleanliness.

2.) *Reliability dimension*: the hotel design provide the function to monitoring cat during stay, daily routine update to cat owner. Additionally, regular cleaning is essential for maintaining cat health and well-being, opportunities to play to reduce stress. This could ensure positive experience during their stay until transition smoothly back home, which ultimately building customer trust and reliability.

3.) *Responsiveness dimension*: in this aspect, the design compose the member who has individual responsible for each job cover all area work field to ensure the smooth operation. The reception is prepared for giving the information and check in/check out process as well as payment service. Contact channel are provide through the several channel both online and offline. However, check in/check out should be limited to avoid disturbing, yet communication still maintain available as 24/7.

4.) *Assurance dimension*: the design really emphasizes to provide the professional care since the staff qualification and training program plan provide before work to ensure customer will received the excellence caring. Facility design to ensure proper hygiene and disease control for feline guests. Additionally, disease prevention protocols begin immediately upon check-in, with comprehensive screening measures taking in place to assure that physical health and mental wellbeing of cats.

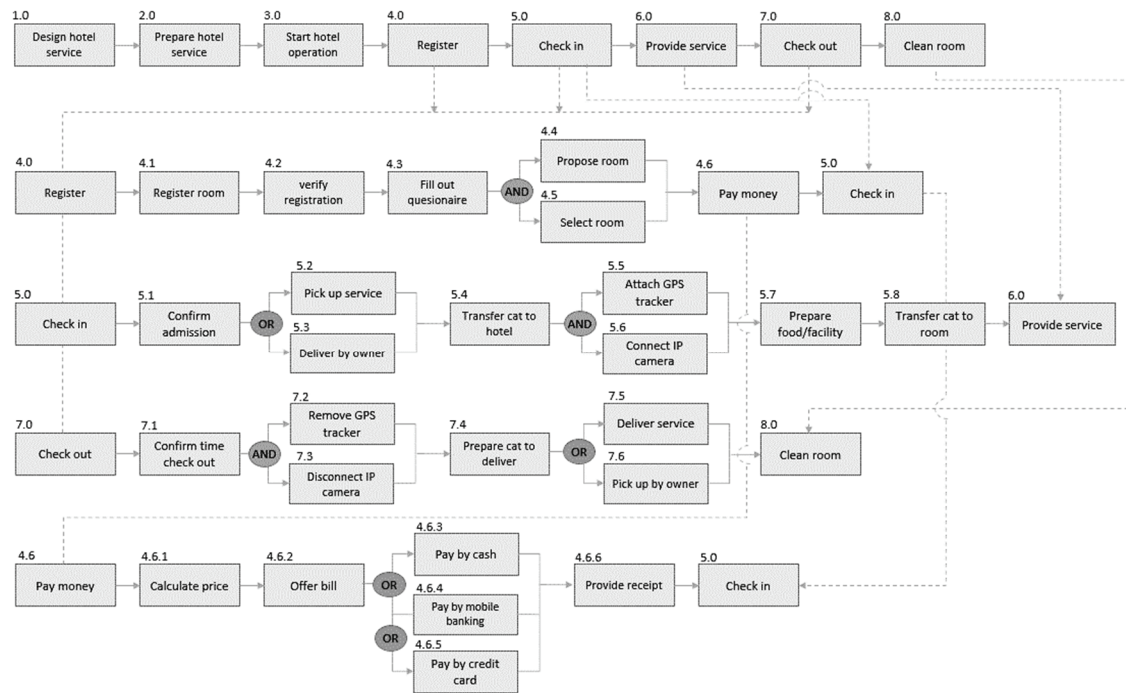
5.) *Empathy dimension*: this was proven through the effort to understand characteristic and behavioural need in order that the design philosophy could be ensure each cat receives personalized care while maintaining their comfort and well-being throughout their stay. Beyond the commitment with cat care, the hotel design also emphasize on the need of cat owner in order to be able to provide the comprehensive service approach for the most satisfactory as well.

6.) *Ethic veterinary dimension*: the hotel design to incorporate with the animal hospital as a one partner which can assist on the technical care assuring in case of need the consultation on cat caring, advise and arrange training about cat behavioural need, cat caring procedure, health care and nutrition to influence hotel staff to ensure that sick cat will be appropriately treated with the best caring.

7.) *Pet safety dimension*: room design recommended to carefully select the material prioritized on pet-friendly grade consistency with usability design. Compulsory requirements of primary health check-up and certificated vaccination before allowed to entrance. Safety design encompass even with hotel staff who has to work with cat, PPE is recommend to be used and vaccination program must be provided. In term of security, GPS tracker device for tracking system and avoid escape is needed, as well as the emergency protocols to cope the unexpected phenomenon are settled to serve and ensure life saving.

Then, the demonstration of hotel service functional flow from the hotel design to help illustrating the service step and outline the activity flow for more understanding is provided as following.

Figure 3. Functional flow of cat hotel service



Last topic to be discussed in this study is about how the cat hotel design can cope with the unpredictably extreme condition. The emergency preparedness is priority as high as the excellence of caring. Certainly, the happened of extreme conditions pose significant risks to both cat and hotel staff, which will potentially causing emotional distress to pet owners as well. Therefore, this section examines how strategic hotel design can help minimize risks and manage emergency situations effectively during extreme conditions to mitigate the severity of such situation. In term of cat hotel operation we will examine the design of facility and operation elements support, for example three potential cases of extreme condition including cats fighting, electrical disruption, and fire as following.

❖ *Cat fighting*

- Hotel staff separate cat with appropriate PPE equipment for safety
- Basic first aid activity for primary assistance
- First aid room installation
- First aid kit with well-stocked supply of basic medications
- Hotel staff training program for first aid activity
- Essential first aid guideline available at room
- Veterinary consultant and cat health diagnostic
- Hospital contact to support in case of severe injury
- Cat owner contact for ingenuously report for the situation

❖ *Electrical disruption*

(a.) State electrical disruption

- Power back up system preparation
- Electric generator installation
- Maintenance program for power back up system as usual

(b.) Electrical short circuit in the hotel

- Immediately contact maintenance service
- Open window for air flowing
- Back up battery for light up inside hotel
- Patrol check to ensure condition of cat and environment

- Maintenance program for electricity system as usual
- Hotel design electrical system ease of maintenance and repair
- Electrical system diagram availability to shorten repairing time

❖ *Fire*

- Detection system incorporate to the design: smoke detection, sprinkler, fire alarm
- Manual call point placed on each floor near exit doors
- Fire extinguisher enough for all area, especially in the blind corner
- Fire escape stair integrated into design
- Carrier preparedness to convey cats
- Perform staff training and annual retaining
- Fire emergency drill yearly plan
- Automatically opened door system for severity fire cannot promptly evacuate
- Fire department contact frequency update to ensure contact availability
- Cat owner contact for ingenuously report for the situation
- GPS tracker to tracking cat location
- Evacuation plan and temporary shelter should be dealing.
- Maintenance program of electricity supply to avoid electrical short circuit
- **Insurance purchasing covering building, human and animal life if have*
- **Remedial plan in case loss of life*
(**Recommendation to be additional arrangement*)

7 CONCLUSION

This research study examines the integration of system engineering for cat hotel design to establish the emerging standard baseline for design and operational frameworks. The hotel design concepts are developed through the system requirement analysis based on the inherently needs of cats, cat owner and hotel staff through the variety of design activities including functionality, usability, supportability, safety, maintainability, environmental, and affordability. As a result, the comprehensive conceptual model of cat hotel are shaped for delivering the excellence care service for customer satisfaction.

System engineering provide an extremely robust foundation for developing comprehensive cat hotel designs. The methodological approach enables the seamless integration of multiple design elements through the various design activities. Throughout the past until present, system engineering have been widely utilized across various products and systems design. This reseach extends theses approach to service design, specifically focus on their application in the cat hotel business. This novel approach demonstrates the versatility of systems engineering methodology in service-oriented applications.

Previously, cat hotel designs have primarily focused on aesthetic appeal and visual attractiveness, or even based on observations of generally existing cat hotel, without adequately addressing the inherently needs and requirements of the user, especially for cat as non-verbal beings, cannot directly communicate their needs and preferences that are the critical issue for historical cat hotel design. Therefore, this study could be transforming the conventional approach of cat hotel design, providing valuable insights and guidelines for entrepreneurs who interested in establishing successful cat hotel business, and this finding will be benefit as a comprehensive resources for both new and existing cat hotel to enable the design

solutions for enhancing service quality and improving operational performance to serve the excellence care service for cat and also provide peace of mind for their owner.

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