

Business Continuity Plan and Disaster Management Planning for Animals Within Zoo Enclosure: A Malaysia Perspective

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ABSTRACT

Zoological parks have been linked to various potential calamities, including the inadvertent release of animal species on a regular basis. To mitigate the risk of animals escaping from these parks, it is crucial to assess the security of animal enclosures and identify the factors that may compromise their integrity. Furthermore, natural disasters pose an ongoing threat to public safety, and in such emergency situations, both animals and humans are vulnerable to harm, potentially endangering public safety. Lastly, the possibility of zoonotic diseases and their transmission among humans through direct or indirect contact with infected individuals or contaminated surfaces poses a significant threat to both the animals and the human staff working in the zoo. This paper will be looking at the three possible disasters and how to mitigate such disasters from happening in Malaysian zoos. Another matter that will be highlighted is the roles and responsibilities of authorities, communication plus testing and training. The Business Continuity Plan (BCP) will be used by the authorities to respond to each scenario, based on which business processes or assets get disrupted and to understand the scale and scope of what they are facing. Risk mitigation factors are also highlighted in this article.

Contribution/Originality: The paper's primary contribution is addressing potential disasters in Malaysian zoos, including animal escapes, natural disasters, and zoonotic diseases. The paper highlights the importance of risk assessment, Business Continuity

Planning, and effective communication and training while emphasizes the roles and responsibilities of authorities and risk mitigation strategies which zoo owners and the respective authorities may take into consideration.

1. Introduction

In most advanced democratic countries, the conduct of by-elections is an integral part in According to the Ministry of Natural Resources and Environment of Malaysia, "zoo" is defined as any area or premises that houses or accommodates wild animals, either for the purposes of conservation, education, research or recreation, and is open to the public ([Kementerian Sumber Asli dan Alam Sekitar, n.d.](#); [Wildlife Conservation \(Operation of Zoo\) Regulations, 2012](#)). To safeguard the well-being of animals and wildlife held in captivity within zoos, significant focus is placed on various aspects, including the design and maintenance of enclosures, cages, nutritional requirements, overall upkeep, and healthcare measures. ([Hassan, 2015](#)).

Recent years have seen several major natural and man-made disasters and emergencies occur in various parts of the world; Malaysia is not excluded. Recent December 2021 floods that affected many areas of the nation including Selangor, Johor, Kelantan and Terengganu have impacted people and animals going about their normal lives Zoo negara is no stranger to floods as stated by Zoo Negara deputy president Rosly Ahmat Lana, a flash flood had hit the area on 10 December 2020 which resulted the death of a sheep ([Benjamin, 2021](#); [Wahab, 2020](#)). During the incident, the zoo staff coordinated rescue operations for the animals in ankle-deep floodwater in which the Ampang Jaya Municipal Council and the Fire and Rescue Department helped with cleaning up the area after the flood. He further states that said the matter had been forwarded to the relevant authorities for further attention to prevent future occurrences ([Wahab, 2020](#)).

The subject of disaster management planning for animals in enclosures is not frequently discussed, but it is an important aspect of emergency preparedness for zoos. In addition to having basic supplies like water and gas, effective preparation requires understanding animal behavior, creative use of facilities, and a significant amount of human effort ([Underwood, 2007](#)). Effective strategic management plays a crucial role in maintaining the longevity and viability of an organization, particularly those in the business sector. Likewise, the financial stability of an organization like a zoo heavily relies on the sustainability of its business practices to ensure its continued existence ([Abidin et al., 2018](#)).

The contingency planning process should result in an action plan that can guide the zoo through a crisis and reduce the impact on visitors, staff, animals, and the facility itself. It is essential for all organizations and facilities to have trained individuals who can respond to incidents that may occur. These individuals may have different roles and responsibilities based on their training or authority, and there should be a framework in place to organize responders and ensure that responsibilities are clearly defined in advance ([Moore, 2014](#); [Underwood, 2007](#)).

The three main questions that will be highlighted it this paper is on the business continuity planning of the Zoo on animal disease infections within enclosure, animal escape scenario from the Zoo and emergency natural disasters which involve transferring the wild animals

to a safer location. Another matter that will be highlighted is the roles and responsibilities of authorities, the communication including testing and training.

2. Literature Review

Developing a strategic management plan is crucial for establishing long-term objectives that take into account all critical aspects of an organization, including finance, customer needs, internal operations, and human resource management. These objectives should align with the organization's purpose or reason for existing (*raison d'être*) to ensure a well-balanced approach to achieving success (Godet, 1989). Zoo Negara is one of the main zoos in Malaysia. The zoo has been in operation for a long time and has a variety of interesting and unique wildlife species. In ensuring that the main mission and vision is achieved, Zoo Negara needs to make changes by reviewing the areas that need to be given attention in strategy development (Abidin et al., 2018; Ten et al., 2020).

According to Underwood (2007), a thorough and all-encompassing plan for managing crises is essential to establish a structured response that prioritizes the safety and welfare of staff, captive animals, visitors, environment, facilities, and property during emergencies. This crisis management plan should take into account foreseeable emergencies determined through a hazard survey, which assesses the potential risks associated with various factors. It should encompass potential hazards posed by neighboring facilities and external elements, as well as the risks that could arise if utility or service providers experience operational failures (Underwood, 2007).

Further, the plan should provide explicit guidance on the management of captive animals and ensure that all staff members have a clear understanding of their responsibilities in this regard. The specific handling of captive animals during a crisis will depend on various factors, including the size and characteristics of the facility, regulatory obligations, and the chosen approach to animal management (Corrigan, 2010; Moore, 2014). The management of zoo disasters should clearly define the individuals responsible for evaluating the level of risk and formulating appropriate responses for each crisis. Effective communication, which is often identified as an aspect requiring enhancement in many organizations, plays a crucial role in this process (Moore, 2014). The plan should include what kind of training the staff need and the equipment required to respond to an emergency (Abidin et al., 2018; Moore, 2014; Underwood, 2007).

According to Moore (2014), the initial phase of institutional readiness involves the development of a risk management policy and an emergency management manual for zoo staff. These documents outline the identified risks and the intended strategies for addressing them. Subsequently, zoo and aquarium managers should regularly review these policies and conduct emergency training, drills, and assessments of real-life scenarios to ensure the institution's preparedness for potential challenges. It is vital to ensure that all staff members are aware of and comprehend these policies. At the departmental level, guards should receive annual training and education plans to equip them with the necessary skills to effectively respond to emergencies. Additionally, custodians play a crucial role by providing comprehensive information about individual facilities, animals, and their behavior, as well as offering feedback on appropriate response strategies. To prevent minor errors from escalating into major disasters, robust crisis containment plans are necessary. Lastly, keepers have the responsibility of regularly inspecting and maintaining secondary escape prevention devices, as well as monitoring

fencing, signage, and perimeter emergency containment systems within their assigned work areas (Moore, 2014).

3. Methodology

The doctrinal approach methodology employed in this paper examines potential disasters in Malaysian zoos, such as animal escapes, natural disasters, and zoonotic diseases. The paper identifies security risks and highlights the roles and responsibilities of authorities, communication, and training. The Business Continuity Plan is used to respond to each scenario, and risk mitigation factors are emphasized.

4. Discussion and Recommendation

Firstly, we would like to draw attention to the concern of animal disease infections within enclosures. The presence of a large population of animals can create a constant threat of diseases, which can spread rapidly if not properly managed. Apart from the loss of valuable and often vulnerable animals, a significant concern is the potential transmission of diseases from animals to their handlers and subsequently to the general public. While the likelihood of such a scenario occurring is low in light of current diagnostic and medical advancements, it should still be considered as a possible consequence of disease transmission (Al Badi & Ahmad, 2019; Ten et al., 2020).

In 2020, the first zoo anthroponosis case (transmission of disease from human to wildlife) was reported where Nadia, the Malayan Tiger kept at the Bronx Zoo, the United States of America was tested positive for SARSCoV-2 contracted the coronavirus from an infected but asymptomatic zookeeper. Three weeks after, four more tigers and three lions tested positive for the virus that causes COVID-19. Nadia's diagnostic information was shared widely with the zoo and scientific community by the Bronx Zoo team (Daly, 2020).

According to Dan Ashe, the president of the American Association of Zoos and Aquariums (AZA), the AZA has played a role in disseminating information from the USDA that highlights the potential for the transmission of the virus from humans to feline species (Daly, 2020). The Bronx Zoo has implemented additional protective measures, such as the use of face masks and goggles, as well as maintaining a minimum distance of six feet, to safeguard the well-being of their animals. They believe that if the virus can be transmitted from humans to large cats, the primary focus should be on addressing the diseases carried by humans. Therefore, it is essential to prioritize human Covid-19 testing (Daly, 2020).

Al Ain Zoo in the UAE has put in place rigorous rules and protocols to ensure adherence to the zoo's contingency plans in order to minimize or manage any potential incidents. Mark Craig, the Director of Life Sciences and acting Chief Operating Officer of Al Ain Zoo, states that they have established clear contingency procedures for managing infectious diseases that need to be reported, in order to prevent them from spreading to other animals or humans (Al Badi & Ahmad, 2019). The zoo complies with government policies and notifies the Director of Animal Welfare, Ministry of Environment and Water of any such cases (Al Badi & Ahmad, 2019).

The contingency plan involves several key steps. Firstly, relevant departments, including the Director of Life Science, the Animal Collection Manager, and senior management staff, are notified about the disease. Secondly, the Ministry of Environment and Water is informed about the situation. A containment zone is then established, with restricted

access to prevent further spread. To control the situation, the unnecessary movement of animals and equipment is immediately restricted, and staff movement is also limited to essential tasks. Finally, proper disposal of cadavers and biohazard waste is ensured to prevent any potential risks (Al Badi & Ahmad, 2019).

Zoo Negara Malaysia implemented new measures in July 2020 to safeguard their primates from potential Covid-19 infections. Dr. Mat Naim Ramli, the director of Zoology, Veterinary Hospital, and Giant Panda Conservation Centre, explained that zookeepers now have their temperatures checked upon arrival for their shifts (Mohd Noor, 2020). To minimize contact between the animals and workers, the zookeepers are divided into two "split teams," each working only four hours at a time. Additionally, the staff will undergo further medical examinations as a precautionary measure. Dr. Mat emphasized that prioritizing the safety of the workers is crucial to safeguarding the animals from the virus. (Mohd Noor, 2020).

Malaysia can try to imitate the steps of Al Ain Zoo in its management of zoonotic diseases which leads to its effectiveness in Controlling an Animal Disease Outbreak. In 2017, Al Ain Zoo faced an outbreak of animal pox, transmitted by biting flies. The veterinary team promptly identified and isolated the affected animals, treating them with appropriate medications and physical methods. Despite the outbreak being relatively minor, Al Ain Zoo's procedures and practices were comprehensive, reflecting their commitment to disease prevention. By vaccinating their animals and adhering to strict protocols, the zoo has successfully minimized animal disease cases compared to other facilities. (Al Badi & Ahmad, 2019).

The second issue to be highlighted is the animal escape scenario from the Zoo. The National Zoological Park (NZP) located in Delhi has its fair share of animal escapes. In 2011, an incident occurred involving a white tigress named Khushi at the zoo. Khushi managed to climb over the iron net separating her cage from a smaller enclosure called the corral, which is located on the west side of the cage. Beyond the corral is a pathway that connects to the reptile house. Upon being alerted to the situation, the zoo authorities swiftly initiated a one-hour operation. They utilized tranquilizer darts to sedate Khushi and ensure the safety of both visitors and staff. As a precautionary measure, access to the enclosure was temporarily closed for over an hour. (Khandekar, 2011).

In the same year, 17 lions and 18 tigers after they escaped from Zanesville Zoo, a private zoo in the US state of Ohio. The Ohio police have shot dead dozens of exotic animals that escaped that day and just six of the animals were recovered alive (Kingston, 2011). A report indicates that a significant number of zoo animal escapes (77%) are considered serious, with half of those being classified as dangerous. The majority (70%) of such cases involve employees being attacked or killed due to interactions with animals. In addition, 27% of reported escapes resulted in injuries or fatalities due to contact between the public and escaped animals (Mihaylov et al., 2016).

According to a study in the NZP, it was found the escapes could be attributed to various factors, such as deficiencies in enclosure design, negligence in maintaining the chain-linked fence and other structures, inadequate dimensions (width, depth, and height) of the moat, and the absence of Closed-Circuit Television (CCTV) surveillance (Singh et al., 2020). To address the issue of animal escapes, it is recommended to prioritize the proper maintenance of the chain-linked fence and other structures. Additionally, monitoring the

potential escape routes through camera surveillance at specific locations can provide effective control and prevention measures. (Singh et al., 2020).

This indicates the importance of having a secure enclosure as proven by the incident occurred in February 2021 at the Sinka Zoo, Indonesia. Two female tigers escaped the zoo after a landslide damaged their enclosure. The result of the escape led to the death of a 47-year-old zookeeper, an ostrich, a monkey and one of the tigers as it behaved aggressively and attempts to tranquilize it failed. The incident led to an extensive search in the town of Singkawang, located in West Kalimantan (BBC NEWS, 2021).

Whereas in Malaysia, a video went viral in year 2020 of rats seen in the penguin enclosure. The Zoo representative gave an excuse that *"Our zoo is quite old. Sometimes there are rats and snakes that managed to make a hole and go in. We have already closed the one in the penguin enclosure"* (The Star, 2020). Recently, in February 2023 a male hog deer has been reported missing from Zoo Negara in Malaysia, having escaped through a stream leading out of the park (Monihuldin, 2023). Another case of animal escape in Malaysia was on 12 March 2023 where two crocodiles in Matang Wildlife Centre, Sarawak escaped after their enclosure was damaged due to heavy rain (Veno, 2023).

This imposes a concern as according to Animal Concerns Research and Education Society in 2010 they conducted on all the zoos in Malaysia and found that 94.3% of the enclosures were rusty or contained harmful items which leaves many of the enclosures in a state of disrepair with extensive areas of rust (Corrigan, 2010). It was also reported that 64.2% of enclosures had poor drainage, with many enclosures having extensive algal growth on the floors. This clearly shows the zoo has its wear and tear, but the management are not maintaining the animal enclosures as regular as they should (Corrigan, 2010).

As we are touching the issue of natural disasters, the third issue to be discussed is the emergency natural disasters which involve transferring the wild animals to a safer location. In the face of natural disasters like hurricanes Katrina and Rita in 2005, the Audubon Zoo in New Orleans experienced minimal animal losses, with only two otters and a raccoon missing. However, the New Orleans Aquarium was significantly impacted by the storm, leading to the unfortunate death of a substantial portion of their fish collection due to power outages. In another instance, the 2007 California wildfires posed a threat to the San Diego Wild Animal Park, resulting in the temporary closure of the facility and necessitating the relocation of certain endangered species from their collection (May, 2018).

It was reported by CBS in 2007 that in response to a series of wildfires in Southern California, the park took proactive measures to enhance its emergency plan in anticipation of potential threats to the site (May, 2018). According to the report, the San Diego Wild Animal Park, now known as the San Diego Zoo Safari Park, is surrounded on three sides by highly flammable coastal sage scrub, which poses a significant and immediate risk to the facility (May, 2018). The park has previously implemented its animal evacuation plan on two occasions, in 1993 and 2007. During the 1993 fire, California Condors residing in the outer areas of the park faced danger. Given the regular occurrence of wildfires in California, zoos and animal parks have dedicated significant time and effort over the years to prepare for such incidents (May, 2018).

Malaysia also has its fair share of natural disasters, and the December 2020 flash flood has forced the zookeepers to urgently relocate the animals in ankle deep flood waters as water

rose up quite quickly (Benjamin, 2021). In 2016 the Department of Veterinary Services has introduced the Animal Emergency Management Manual (AEMMA) as guideline in managing and relocating animals safely during natural disasters (Jabatan Perkhidmatan Veterinar Malaysia, 2016). This guideline is a general guideline which can be used for all animals (domestic and wild). Malaysia Zoo operators must adapt the guideline accordingly to make it suited with the various wild animals in the Zoo enclosure (Jabatan Perkhidmatan Veterinar Malaysia, 2016).

Another matter that will be highlighted is the roles and responsibilities of authorities, the communication including testing and training. Under the Wildlife Conservation Act 2010, there is a prerequisite to operate a zoo, where in order to get the permit to operate, Section 28(b) entails zoo operators must have an emergency response plan which covers the matters on plague, natural disaster and accidental release of any wildlife. All zoos in Peninsular Malaysia must obtain the permit to operate a zoo as this requirement is under the control of the Wildlife and National Parks Department (PERHILITAN) (Wildlife Conservation Act, 2010).

The Smithsonian's National Zoo Smithsonian Conservation Biology Institute Washington has released a set of guidelines for training zoo staff on emergency procedures. The training should be done regularly, and records of the training should be kept. This ensures that staff are aware of their duties and responsibilities during emergencies. The training should also include security awareness sessions that emphasize personal responsibility, situational awareness, physical fitness, communication skills, and other necessary elements for a safe work environment. Each training session should be customized to a single unit, and curators, supervisors, and keepers should work together to integrate situational issues (Moore, 2014).

According to the Benchmarking Study on Key Focus Areas in Strategy Development of a Zoo in Malaysia, apart from Animal Care and Customer Satisfaction, 80% of the attention given by Zoo that has an effective Business Plan is on its Conservation Impact (Abidin et al., 2018). Most zoos that achieve high standards in Animal Care will also focus on Conservation Impact which aims to raise awareness and provide opportunities for various parties including the public to participate and be consistent in carrying out conservation activities. In order to ensure proper business continuity plans to take place, Malaysian Zoos must implement the plans accordingly (Abidin et al., 2018).

Several authors contend that an organization lacking a continuity plan is vulnerable to crises and may be referred to as a "crisis flat" or "crisis-prone" organization (Sawalha, 2020). It is established that emergency plans for animals is crucial for animal-centered organizations and individuals, as well as an essential component of community disaster response plans (Rogers, 2016).

Even though Section 28(b) of the Wildlife Conservation Act 2010 requires the zoo operator to prepare an emergency plan, relating to plague, natural disaster and animal escape however, nothing in the Act touch on the need for regular review and update of the said plan (Wildlife Conservation Act, 2010). Further, article 1.43.212 of the *Garis Panduan Standard Zoo Malaysia* by the Ministry of Natural Resources and Environment only states the need of an Emergency Response Plan but do not touch on the need to update the plan continuously and the said article is as follows:

"1.43.212 Setiap zoo hendaklah menyediakan bantuan kecemasan apabila diperlukan dan mempunyai pelan tindakan kecemasan (Emergency Response Plan - ERP) bagi setiap keadaan di bawah dengan menggariskan langkah-langkah/prosedur terlibat.

i. Hidupan liar yang terlepas;

ii. Bencana alam seperti banjir, ribut, gempa bumi, tsunami dan sebagainya; dan

iii. Wabak penyakit."

Source: [Kementerian Sumber Asli dan Alam Sekitar \(n.d.\)](#)

According to several studies, approximately two thirds of the organizations with business continuity plans have conducted testing in the past year, while 15% have never done so ([Sawalha, 2020](#)). Around 60% of organizations across all sectors and 53% in the manufacturing sector have updated their plans at least once a year, with an additional 20% updating them every six months ([Sawalha, 2020](#)). If an organization fails to maintain and update their business continuity measures, they may experience a decline in their ability to respond effectively to situations, which can result in a loss of agility ([Lindström et al., 2010](#)).

5. Conclusion

The implementation of crisis and business continuity planning serves a dual purpose: protecting the organization from catastrophic events and equipping the animal care staff and other crucial departments to effectively handle any disaster that may arise. To further explore, study, and implement effective continuity plans and emergency management strategies, the references provide valuable insights and guidance. By developing a comprehensive crisis management plan, the organization can effectively mitigate the impact of a disaster and ensure a more resilient response. In making the plan, Malaysian Zoo owners should consider the worst then plan, prepare and regularly update for the best possible results. This will ensure disasters which involves incidences such as animal escapes, spreading of zoonotic diseases and animal relocation during natural disasters could be carried out in a proper manner which will lessen the impact of financial loss to the zoo.

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Conflict of Interest

The author reported no conflicts of interest for this work and declare that there is no potential conflict of interest with respect to the research, authorship, or publication of this article.

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