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CAPTIVE AND SEMI-CAPTIVE ELEPHANT MANAGEMENT IN SOUTH AFRICA: ETHICAL ANALYSIS OF VISITORS AND OWNERS PERSPECTIVE.

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ABSTRACT

This thesis project is an integral part of a larger research designed to construct an ethical matrix that evaluates the needs and interests of stakeholders involved in the management of captive and semi-captive elephants in South Africa. To gather the necessary data, comprehensive questionnaires were distributed to two key stakeholder groups: visitors and elephant owners/managers. These questionnaires, developed with a focus on the ethical pillars of well-being, autonomy, and fairness, aimed to explore stakeholders' knowledge, opinions, and ethical considerations related to elephant care, management, and conservation. The visitor questionnaire sought to understand the motivations for zoo visits, satisfaction with elephant care, and opinions on elephant welfare and conservation. Meanwhile, the owner/manager questionnaire delved into work satisfaction, safety perceptions, and the freedom to make decisions regarding elephant care. Both sets of questionnaires also inquired about the respondents' awareness and desire for more information about elephants, underscoring the study's goal to identify knowledge gaps and areas for improved communication. Survey administration took place at various facilities in South Africa, including zoos, wildlife sanctuaries, and conservation centers, ensuring a broad spectrum of insights. Data collected were then analyzed to identify trends, preferences, and areas of concern, with the ultimate aim of integrating these findings into the ethical matrix. The findings highlight a complex interplay of ethical considerations, revealing a general consensus on the importance of elephant welfare and conservation. However, they also indicate significant gaps in stakeholder knowledge and communication, as well as concerns about the practicality and fairness of existing management guidelines. This project underscores the necessity of an integrated and inclusive approach to conservation, emphasizing the importance of understanding stakeholders' opinions, values, and needs, thereby laying the groundwork for future enhancements in the management and protection of elephants in South Africa.

1. INTRODUCTION

1.1 Captive and semi-captive management of elephants in South Africa

In South Africa, the approach to elephant management in captive and semi-captive environments is multifaceted, reflecting a broad spectrum of philosophies and objectives ranging from conservation and rehabilitation to education and research. This diversity is manifested in the various types of facilities dedicated to the care and conservation of elephants; wildlife sanctuaries, rehabilitation centers, game reserves, protected areas, and zoos. (de Mori et al., 2019). The diversity of these facilities underscores the complexity of elephant management and conservation in South Africa. Each plays a unique role in the broader conservation landscape, contributing to the welfare, understanding, and preservation of African elephants (Beirne et al., 2021). As these efforts continue to evolve, integrating scientific research and ethical management practices remains paramount (Evans et al., 2013). There is an ongoing need for evidence-based approaches to enhance the welfare and conservation of elephants in both captive and semi-captive settings. The evaluation of the management practices of elephants (*Loxodonta africana*) in captive and semi-captive settings is primarily focused on ethical implications, animal welfare, social and ecological integration into wild populations and social groups, and human-animal interactions (Rossman et al., 2017).

Regarding ethical and welfare considerations, there are various ethical and scientific issues related to applying knowledge about the welfare of zoo elephants to semi-captive elephants involved in wildlife tourism in South Africa. It is crucial to develop specific welfare assessment protocols for semi-captive elephants, considering their greater freedom of movement and the different modes of interaction with humans (de Mori et al., 2019).

In South Africa a variety of conservation strategies have been developed and implemented aimed at ensuring the welfare and sustainability of elephant populations within controlled environments (Young et al., 2011). These measures not only aim to replicate natural habitats (Aarde et al., 2006) as closely as possible but also to foster a deep understanding and respect for these animals among the public and conservationists alike (Young et al., 2011). Practical examples of these conservation practices can provide insights into the effectiveness of such approaches, the challenges faced, and the potential for future enhancements in the management and protection of elephants in South Africa (Whitehouse et al., 2002). An example of social and ecological integration is the documented release of three adolescent

male elephants raised in captivity in the Okavango Delta, Botswana, highlighting their progressive integration into the complex fission-fusion society of wild male elephants. This case study shows that, with proper preparation and monitoring, elephants raised in captivity can be successfully integrated into wild populations, without significant welfare problems either for the released elephants or the recipient population (Evans et al., 2013). Another study demonstrated the effectiveness of immunocontraceptive contraception as a population management tool in a small population of free-ranging elephants in the Makalali Conservancy, Limpopo, South Africa. This approach has maintained zero population growth among the target females since 2002, presenting itself as an ethical and sustainable alternative to selective hunting or translocation. This study is important for population management and contraception. (Delsink et al., 2006). Regarding the impact of human interactions, the behavioural and welfare impacts resulting from the release of elephants from overnight tethers in a case study in Zimbabwe. The results indicate that management changes, such as the removal of night tethers and the provision of larger enclosures, can improve elephant welfare, as evidenced by an increase in lying rest, positive social behaviour, and a reduction in stereotyped behaviours (Williams et al., 2022). The case study this research is focused on includes some aspects described in the previous examples: social interaction, welfare implications, and management practices; three elephants housed at the Johannesburg Zoo (Lammie, Mopane, and Ramdiba). This group of elephants is not related, and this may lead to complex social interactions as a result of their diverse histories. Such varied pasts, in combination with management approaches, have the potential to adversely affect their welfare. Nonetheless, effective management can preempt many of these challenges, thereby securing a positive welfare outcome for the group (Mason et al., 2010). Furthermore, understanding the unique history of each elephant can inform a more personalized approach to their care, acknowledging how past traumas or experiences may influence their current behaviour and social compatibility (Meehan et al., 2016).

In scenarios in which animal welfare and management are involved, the complexity is increased by the ethical implications involved. These are also related to the involvement of a range of stakeholders, each with their own unique viewpoints, interests, and requirements related to elephant management. This opinion diversity may lead to conflicts, especially considering the complexity of elephant management and the species' intricate needs (Greco et al., 2016). It is crucial, then, to explore these differing perspectives (Young et al., 2011).

The ethical analysis can be used to investigate the different opinions and value demands involved in a scenario. In particular, the Ethical Matrix (EM) is an ethical tool that serves as a framework designed for the systematic ethical evaluation of current or potential technologies, scenarios, interactions, and policy choices, aiding in the decision-making process (Mephan et al., 2006). While it does not dictate specific actions (England et al., 2008), it assists decision-makers in arriving at well-founded and justifiable conclusions (Mephan et al., 2006). This is achieved by cataloging the ethical interests at stake, highlighting any potential conflicts, and predicting both the positive and negative effects on the stakeholders involved (Mephan et al., 1996). The present research contributes to a larger project that aims as final outcome to compile an ethical matrix to identify potential conflicts and pose a basis for the analysis of complex scenarios in captive and semi-captive elephant management in South Africa.

Our study aims to investigate the ethical considerations of both visitors and elephant owners using questionnaires, as well as their opinions and knowledge. These two stakeholder categories are recognized as the most important, owners because their decisions have a direct impact on elephant welfare (Chadwick et al., 2017). The analysis of owners' opinions, with a structured methodology, can allow us to provide science-based information about ethical implications for elephant management while providing a better understanding of personal implications that may influence how managers make decisions (Young., 2011). In addition, this study investigates how elephants, animal welfare, and management decisions are perceived by visitors in a zoological facility. For tourists, the main aspects involved are that their personal opinions can influence support for conservation projects sustained by facilities (Ballantyne et al., 2009). Since they are the main supporters of conservation projects (Cousins et al., 2009), their opinions can influence the future of conservation for specific species (Ballantyne et al., 2009).

Elephants in captive and semi-captive facilities depend on human care, management, and decisions for their welfare, future, and conservation as a species (Veasey et al., 2006). To secure a sustainable future for African elephants, we need to continue research, collaboration, and innovation (de Mori et al., 2019), applying a holistic approach that considers animal welfare, ethical implications, their integration into preexisting captive or wild populations, and the impact of human interactions and opinions. In managing and conserving elephants in South Africa, combining ethical considerations, stakeholder input, and welfare practices is key. This approach aims not just to improve individual elephant welfare but also to support their overall survival (Young et al., 2011). The collective efforts and understanding of

everyone involved, from owners to visitors, play a crucial role in ensuring a secure future for elephants, both in captivity and in the wild (Rees et al., 2020).

1.2. Stakeholders' opinion analysis

The application of opinion analysis in various scientific fields, particularly in contexts involving stakeholders in specific scenarios, conflicts, or situations, is widely recognized. Stakeholder analysis is increasingly important for understanding how the characteristics of stakeholders influence decision-making processes (Brugha et al., 2000). Involving all relevant stakeholders in an open and transparent manner is crucial for thoroughly understanding their opinions and expectations. This can include the use of questionnaires, in-depth interviews, and group discussions (Brugha et al., 2000). Opinions collected through questionnaires can be statistically analyzed to identify optimal strategies and prevalent trends among different stakeholders. In some cases, such as in the study of agroforestry systems, a multi-criteria evaluation is employed to balance and consider various aspects of forest management, including economic, environmental, and social factors (Paletto et al., 2017). In sectors like urban mobility, stakeholder opinions guide the transition towards more sustainable and innovative practices by highlighting preferred paths and potential barriers (Foltýnová et al., 2020).

For example, Vanhonacker and colleagues (2012) developed a conception of animal welfare starting from the public's perception and integrating the opinions of various stakeholder representatives. Detailed interviews with representatives of stakeholders were employed to align and modify the framework of the model for animal welfare conception (Vanhonacker et al., 2012). Another article explores the representations of farmers and advisors on animals and animal welfare, highlighting both a sharing of ideas, such as the importance of managing animals and observation as a fundamental activity for a farmer, as well as the diversity of representations and practices related, for example, to affection towards animals and the ethical vision of their occupation. They opted to explore the "ethics" of farmers and advisors through how they defined their occupation, their relationship with animals, and their approach to animal welfare (Dockès et al., 2006). Another study specifically focuses on analyzing stakeholders' opinions on various actions to enhance the forest-based sector. Through a questionnaire submitted to 99 stakeholders, data were collected and statistically

analyzed to identify the best strategy for improving the economic conditions of the forest sector in a case study in Italy (Paletto et al., 2017).

Engaging stakeholders through open and transparent methods, for example, employing detailed interviews, and aligning with stakeholders' opinions and expectations can provide a robust foundation for an expanded stakeholder engagement approach and a cooperative conservation strategy (Sterling et al., 2017).

A further step, included in the ethical approach to conservation (Wallach et al., 2018), is to acknowledge animals as stakeholders. Following this approach, conservation and management strategies can move towards more holistic and inclusive planning that considers the intricate relationships between humans and animals, their individual and social needs, and their roles within ecosystems (Edelblutte et al., 2022).

1.3. Stakeholders' role in conservation

In wildlife conservation, stakeholders encompass a wide range of individuals and groups with vested interests, including owners of the facilities and visitors (Decker et al., 1996). In this scenario, captive facilities play a crucial role in education, conservation, and research, balancing the needs of the animals with the interests and expectations of visitors and facility owners (Ballantyne et al., 2007). Indeed, understanding the multifaceted dynamics of animal welfare and conservation within zoos, captive and semi-captive environments necessitates a comprehensive approach that includes stakeholder engagement (Sterling et al., 2017).

From visitors' perspective, their experiences and interactions within zoo environments hold significant implications for both their perceptions of animal welfare and their contributions to conservation efforts (Brando et al., 2017). In addition, visitors are always more aware of the importance of animal welfare and are keen to see that animals housed in captive facilities live in environments that reflect their natural habitats and that they exhibit natural behaviours (Whitham et al., 2013). This awareness influences visitor satisfaction and their overall perception of the facility (Brando et al., 2017). Positive experiences, where animals are seen engaging in naturalistic activities in well-designed enclosures can foster a deeper connection between visitors and wildlife, potentially leading to increased support for conservation initiatives (Sherwen et al., 2019). Moreover, visitor engagement through interactive exhibits, educational talks, and the opportunity to observe conservation practices firsthand can enhance their understanding of the challenges faced by wildlife and the importance of

conservation efforts (Bowler et al., 2012). This engagement is crucial for facilities aiming to inspire a conservation ethic among their visitors (Meehan et al., 2016). Studies have shown that when visitors feel a connection to the animals they observe, they are more likely to participate in conservation behaviours, such as making donations, adopting sustainable practices, or advocating for wildlife protection (Brando et al., 2017). However, the visitor effect on captive animals must be carefully managed to ensure that it does not negatively impact animal welfare (Sherwen et al., 2019). Strategies to manage the visitor effect on animals include providing animals with areas to retreat from public view, scheduling regular quiet and natural times, and educating visitors on respectful behaviour near animal habitats (Brando et al., 2017), balancing the need for visitor engagement with the necessity of providing a calm and enriching environment for their animals (Davey et al., 2007).

Another crucial stakeholder category for wildlife conservation includes owners and managers of semi-captive, captive facilities, and zoos (Greggor et al., 2018). From the perspective of these stakeholders, their role encompasses a multifaceted array of responsibilities, including animal welfare, educational involvement, conservation efforts, and visitor engagement (Brando et al., 2017). Balancing these elements requires a deep understanding of the complex needs of the animals under their care, as well as the expectations of visitors while keeping in mind conservation goals (Brando et al., 2017). A primary concern for owners is ensuring the highest standards of animal welfare (Greggor et al., 2018). The welfare of the animals is not only a moral obligation but also influences the perceptions of visitors and conservation groups (Brando et al., 2017). Indeed, owners must design facilities that are welcoming and educational while ensuring the safety and comfort of both visitors and animals (Smit et al., 2015). This includes managing the potential impact of visitors on animal welfare, creating spaces that allow for meaningful interactions without causing stress to the animals (Davey et al., 2007). Concerning conservation, owners of zoological institutions are increasingly recognizing their role in supporting global biodiversity preservation efforts. This involves participating in breeding programs for endangered species, contributing to research and engaging in partnerships with organizations, and contributing to conservation efforts on a global scale (Miller et al., 2014). At the same time, owners and managers need to create informative and engaging experiences for visitors that raise awareness about wildlife conservation and encourage positive behaviours towards the environment (Ballantyne et al., 2007). This involves not only the dissemination of information but also the creation of emotional connections between visitors and animals, which can be powerful motivators for

conservation action (Brando et al., 2017). . In addition, owners and managers must stay informed about the latest developments in animal welfare science, conservation strategies, and educational methodologies to continually improve their facilities and contribute to the broader goals of wildlife conservation and education (Ward et al., 2018).

By incorporating the perspectives, needs, and active participation of all stakeholders, conservation projects can achieve greater impact and support, ultimately contributing to the sustainability and success of conservation initiatives and the well-being of animals in captivity (Sterling et al., 2017).

2. AFRICAN ELEPHANT
2.1. Biology and ecology

African elephants (*Loxodonta africana*) play a critical ecological role in African savannas and forests, acting as ecosystem engineers and keystone species (Lindsay at el., 2017). Through their feeding habits, such as uprooting trees and stripping bark, they can transform woodlands into grasslands, thereby maintaining the balance between different types of vegetation cover. This not only affects plant diversity but also influences the habitat availability for other species (MacFadyen et al., 2019). Their dung is a critical component in nutrient cycling, redistributing nutrients across vast areas. This not only fertilizes the soil but also provides breeding grounds for insects, contributing to the complexity of food webs (Parker et al., 2009) and also facilitates plant regeneration and genetic diversity across the landscape (Maisels et al., 2013). In arid environments, elephants dig water holes that can be used by other species, thus providing crucial resources during dry periods. These activities enhance the availability of water resources, benefiting a wide range of animals (Douglas et al., 2005) and facilitating plant regeneration.

African elephants are found across a wide range of environments. Despite their broad geographical distribution, populations are more concentrated in protected areas due to habitat loss and poaching (Chase et al., 2016). Their significant presence in areas such as Kruger National Park in South Africa, the Okavango Delta in Botswana, and the rainforests of the Congo Basin reflects their adaptability to various types of vegetation and climates (Douglas et al., 2005). There is genetic evidence for the separation of African elephants into two species; forest and savannah elephants (Roca et al., 2001; Comstock et al., 2002).

Savannah elephants are typically larger, with more expansive ears and predominantly inhabit open grasslands across sub-Saharan Africa (Mondol et al., 2015). In contrast, forest elephants, which are smaller with rounder ears and straighter tusks, are found in the dense rainforests of the Congo Basin and West Africa. These morphological adaptations are reflective of their distinct habitats and lifestyles (Bonnald et al., 2022).

Morphologically, African elephants are renowned for their impressive size, with males reaching heights of up to 4 meters at the shoulder and weighing as much as 7,500 kg. Females are generally smaller (Schuttler at el., 2012). The large ears, versatile trunks, and ivory tusks of African elephants are not only fascinating aspects of their biology but also adaptations that have enabled them to thrive in diverse African landscapes (Wasser et al., 2004). A distinctive feature of this species is the presence of large ears, which serve as a thermoregulatory adaptation (Knight et al., 1981). The intricate network of muscles and nerves in the trunk (Moss et al., 2011) acts as a tool for feeding, communication, and object manipulation (Mondol et al., 2015). A key difference between Asian elephants (Elephas maximus) and African elephants is that, unlike their Asian counterparts, both male and female African elephants possess tusks (Weissengruber et al., 2005). Tusks are not only a distinctive characteristic but also play vital roles in their lives. Elephant tusks are utilized for digging, carrying objects, and behavioural displays, serving multiple functional and social roles within their environment (Weissengruber et al., 2005). However, the value of ivory to humans has led to severe threats to elephant populations due to poaching for the illegal ivory trade (Chase et al., 2016). The diet of African elephants is diverse and varies with seasons, habitats, and regional differences. These elephants are known for their flexible feeding habits, consuming both grass and browse (leaves, twigs) depending on the availability of these resources (Wood et al., 2019). They shift their diet from a higher intake of C4 grasses (incorporate CO_2 into a four-carbon compound) during the wet season to more C3 browse-dominated (incorporate CO_2 into a three-carbon compound) diets in the dry season (Codron et al., 2010). Sex and size also play a role in feeding patterns, with adult males exhibiting less diversity in their diet compared to family units. This difference is likely due to the sexual size dimorphism, influencing browsing patterns and dietary choices based on the availability and quality of browse (Stokke et al., 2000).

Generally, elephants in captivity can live many years, often reaching 40-50 years of age, but this is typically less than their potential lifespan in the wild (Hermes et al., 2004). Proper management, including appropriate diet, physical exercise, mental stimulation and prevention

and treatment of diseases, are key factors in enhancing the health and longevity of captive and semi-captive elephants (Evans et al., 2013). African elephants in the wild can live up to 60-70 years in the wild, with females often continuing to reproduce into their 50s (Hermes et al., 2004). The longevity of elephants allows them to have multiple offspring over their lifetime, contributing to the genetic diversity and resilience of the population. (Lee et al., 2016). African elephants exhibit a polygynous mating system, characterized by intense male competition and selective female mate choice (Buss et al., 1966). Male elephants undergo a unique physiological and behavioural state known as musth, characterized by increased aggression, sexual activity, and elevated levels of testosterone (Hanks et al., 1972). Musth is associated with greater reproductive success, as females preferentially mate with musth males (Hollister et al., 2007). Females typically reach sexual maturity between 10 to 12 (Buss et al., 1966), instead, male elephants must grow to reach a considerable age and size to achieve musth and a high social status, generally 25 years or older (Hollister et al., 2007). Elephants have one of the longest gestation periods among land mammals, lasting about 22 months (Lee et al., 2013) and the breeding season is not strictly defined, allowing for year-round reproduction (Buss et al., 1966), although some studies suggest a peak in births during the wet season when food resources are abundant (Hanks et al., 1972). Reproductive health and cyclicity in captive African elephants pose significant challenges, with a high incidence of acyclicity and reproductive tract pathologies observed. These issues highlight the importance of understanding and managing the complex reproductive needs of elephants in zoos and sanctuaries to ensure their health and contribute to conservation efforts (Brown et al., 2004).

2.2. Behaviour

African elephants are renowned for their sophisticated social organization and behaviour (De Silva et al., 2011), distinguished by well-defined social groups and dynamic interactions (Wittemyer et al., 2007). The matriarch, often the oldest and most experienced female (Archie et al., 2006), plays a central role in decision-making processes such as foraging strategies, migration routes, and responses to threats (De Silva et al., 2012). Her accumulated knowledge passed down through generations, is essential for the survival and cohesion of the herd (Wittemyer et al., 2013). Females spend their entire lives within their family unit, which can significantly vary in size and is often composed of blood-related females and their offspring (De Silva et al., 2012). A remarkable aspect of this social structure is the practice of

alloparenting, where juvenile and adolescent females, known as "allomothers", play a vital role in the care and protection of calves within the family unit. These allomothers, typically family members but not always direct siblings, engage in a range of supportive activities including friendly greetings, investigations, and providing assistance to calves when they are threatened or distressed (Lee et al., 1987).

Conversely, males leave their natal group during adolescence to lead a more solitary life or to join bachelor groups (Allen et al., 2020). These bachelor groups provide young males with a valuable environment to learn social and combat skills (Evans et al., 2008) crucial for their future reproductive success (Allen et al., 2020). Elephants exhibit remarkable adaptability in their social relationships, engaging in a behaviour known as "fission-fusion" (Fishlock et al., 2013). This involves groups splitting and reuniting in response to environmental conditions and the availability of resources (Vance et al., 2009). Within the dynamic social structure of a free-ranging African elephant population, four distinct social tiers have been identified. The second-tier units, comparable to family groups, maintain stability across seasons. In contrast, the cohesion of third and fourth-tier units varies, indicating a balance between ecological demands and social advantages. This nuanced social stratification reveals elephants' sophisticated approach to managing group dynamics in the face of changing environmental challenges (G. Wittemyer et al., 2005). Elephant social dynamics extend beyond the bounds of kinship, incorporating direct benefits from group association, such as predator defence and improved foraging efficiency (Wittemyer et al., 2009). Research on African elephants relocated to new environments revealed a decrease in conspecific association over time, underscoring the hypothesis that sociality confers additional benefits in unfamiliar settings. A significant correlation was observed between physical condition and social connectivity, indicating that elephants derive tangible advantages from their social interactions (Pinter et al., 2009). Furthermore, the influence of environmental conditions and kinship on the formation of elephant social networks sheds light on the flexibility of elephant social organization, demonstrating their capacity to adapt to varying ecological and social pressures (Vance et al., 2009).

The communication system of African elephants is a sophisticated network that extends far beyond human auditory capabilities, encompassing a wide spectrum of sounds from audible calls to infrasonic rumbles, up to several kilometers, through the ground and air (Poole et al., 2005). These vocalizations serve a pivotal role in the social structure and survival of elephant

herds (Roca et al., 2005). The ability to communicate over vast distances, facilitate the coordination of herd movements, particularly in the dense forests or across the expansive savannahs where visual contact is not always possible (Poole et al., 2005). These low-frequency sounds are critical for maintaining the cohesion of elephant groups, allowing separated individuals to reunite and enabling the sharing of information about food and water sources (Langbauer et al., 1991). Moreover, elephants use these vocalizations to express a range of emotions, including joy, distress, and aggression. The ability to convey emotional states plays a crucial role in the social complexity of elephant herds, supporting the development of strong bonds between individuals and facilitating cooperative behaviours (Bates et al., 2007). For instance, the mourning behaviour observed in elephants, where they linger over the bodies of deceased herd members, often involves vocal expressions of grief, highlighting the depth of their social and emotional connections (Douglas et al., 2006). The communication repertoire of elephants also includes tactile and chemical signaling, which complements their vocal communications. Tactile interactions, such as trunk touching and body rubbing, are prevalent during social gatherings, reinforcing familial bonds and hierarchies within the herd (Hart et al., 2001). Chemical communication through scent marking and pheromones plays a significant role in reproductive behaviours, enabling elephants to detect the fertility status of potential mates and to establish dominance among males during musth periods (Ghosal et al., 2012).

2.3. Conservation

The conservation of the African elephant is a critical issue that demands urgent attention (Chase et al., 2016) due to their declining numbers caused by poaching, habitat loss, climate change, and human-elephant conflicts (HECs) (Chwalibog et al., 2018). A continent-wide survey known as the Great Elephant Census revealed a dramatic decline in the population of African savannah elephants, with an estimated 144,000 elephants lost between 2007 and 2014, primarily due to poaching (Chase et al., 2016). Poaching remains a major threat to African elephants, primarily driven by the illegal ivory trade (Chase et al., 2016). In Chebera Churchura National Park, Ethiopia, during 2020-2021 estimated a total elephant population of 756 individuals with a density of $0.53/km^2$ (Tegegne et al., 2022). In Ruaha National Park, Tanzania, expertise highlighted the differences in group size and composition between areas

of high and low poaching levels, highlighting poaching's role in shaping elephant grouping patterns and causing reproductive suppression (Mkuburo et al., 2020). Habitat loss is another critical threat to African elephants, caused by expanding agricultural activities, deforestation, and urbanization (Graham et al., 2009). Elephants require large territories for their seasonal migrations, access to water, and sufficient food resources (Huang et al., 2022). The fragmentation of their habitats not only reduces the available space but also isolates populations, affecting their genetic diversity (Lobora et al., 2017) and increasing human-elephant conflicts (Graham et al., 2009).

Human-elephant conflicts (HECs) arise when elephants intrude on agricultural lands, leading to crop damage, property destruction, and sometimes loss of human life (Shaffer et al., 2019). These conflicts are a direct result of habitat loss and fragmentation, forcing elephants into closer proximity with human settlements (Mumby et al., 2018). Effective management of HECs involves the implementation of mitigation measures such as the use of bee fences, chili fences, and early warning systems (King et al., 2017), as well as community-based conservation programs that promote coexistence (Ramasubramanian et al., 2022).

These issues collectively exacerbate the vulnerability of African elephants, underscoring the complexity of conservation challenges and the need for a multifaceted approach to ensure their future survival (Chwalibog et al., 2018). So, it is important to have up-to-date information on population size, age structure, and seasonal movement patterns for conservation efforts (Geleta et al., 2022).

Conservation strategies must prioritize the protection of elephant habitats and migration corridors to maintain ecological connectivity and support sustainable elephant populations (Giliba et al., 2023). For example, the Tarangire-Manyara ecosystem in Tanzania showcases the importance of protecting migration routes and addressing human disturbance to ensure the survival of elephant clans that depend on these landscapes for their seasonal migrations (Galanti et al., 2006).

Conservation efforts for African elephants must adopt an integrated approach that addresses all these threats simultaneously. This includes strengthening anti-poaching patrols (Archie at al., 2012) and legal frameworks, supporting community conservation initiatives, enhancing habitat connectivity through the establishment of corridors and protected areas (Galanti et al., 2006), and adapting to climate change impacts (Hiness et al., 2023). International collaboration and support are crucial in enforcing laws against the illegal ivory trade and promoting elephant conservation on a global scale (Lindsay at al., 2017).

In conclusion, the conservation of the African elephant is a complex challenge that requires concerted efforts from governments, conservation organizations, communities, and international bodies (Chase et al., 2016). The loss of elephants, which are ecological engineers, is likely to result in significant changes to the composition and structure of forests, affecting ecosystem functions and biodiversity (Poulsen et al., 2018). Only through integrated conservation strategies there is hope for securing a future for these majestic creatures in their natural habitats (Breuer et al., 2016). In addition to these conservation efforts, the role of well-managed captive and semi-captive facilities cannot be overlooked, as they serve as vital centers for education, research, and ex-situ conservation, contributing significantly to preserving African elephants and their ecosystems for future generations (Evans et al., 2013).

2.4. Species' necessity in captive and semi-captive facilities

Captive and semi-captive facilities play a crucial role in safeguarding African elephants by providing safe havens and breeding programs (Wittemyer et al., 2013). However, for these facilities to be truly effective in the long term, it is imperative to fully understand the biological, behavioural and conservation needs of African elephants (Roisin Stanbrook et al., 2018). The increasing threat posed by habitat loss, deforestation, agricultural expansion, and natural resource exploitation are rapidly diminishing the available wilderness areas for this species, jeopardizing their survival (Blake et al., 2007). Additionally, the devastating impact of poaching on African elephants, leads to a rapid decline in populations in many regions of the continent (Maisels et al., 2013). Captive and semi-captive facilities can offer a secure refuge for African elephants (Young et al., 2011), allowing them to avoid the threats present in their natural habitats. These facilities are also important because they provide veterinary care and breeding programs that can contribute to species conservation (Clubb et al., 2002).

Although African elephants possess remarkable cognitive abilities that allow them to adapt to diverse environments and solve complex problems (Polansky et al., 2015), housing them in captive and semi-captive environments requires a thorough understanding of their ecological and behavioural needs. (Mason et al., 2016). For African elephants, it is important to provide spacious and stimulating environments that allow them to exercise, socialize, and engage in natural behaviours such as foraging and bathing. (Greco et al., 2016). Studies have shown that

the lack of adequate environmental stimuli can cause stress and abnormal behaviours in animals housed in captivity. (Mason et al., 2010). It is important to provide a diversified diet for the health and well-being of elephants in captivity. (Clubb et al., 2002). Diet is a critical aspect of the biology of captive species (Hartstone-Rose et al., 2014). Captive and semi-captive facilities play a critical role in the conservation of African elephants, serving as sanctuaries for individuals who cannot survive in the wild and as breeding centers for population management (Witzenberger et al., 2011). So, it is crucial to provide an environment that promotes natural reproductive behaviour and minimizes the stress associated with reproduction in captivity (Hildebrandt et al., 2006). For African elephants, this may include creating stable social environments, offering private spaces for mating and birthing, as well as implementing health monitoring programs to ensure reproductive health (Williams et al., 2018). To ensure the long-term viability of African elephant populations genetic management in captive breeding programs is important (Roca et al., 2005). Facilities must carefully manage breeding pairs to ensure optimal genetic representation and avoid the deleterious effects of inbreeding (Willoughby et al., 2017). Those facilities serve also as valuable platforms for raising awareness about the conservation challenges facing elephants and inspiring public support for their protection (Crawley et al., 2019).

3. MATERIAL AND METHODS
3.1 Study area

We conducted owner surveys at three facilities in South Africa (Adventures with Elephants, Glen Afric, and African Hills) to investigate the needs and interests of stakeholders involved in the management of captive elephants. Our research also included online questionnaires.

Adventures with Elephants is an educational wildlife interaction facility aimed at conserving African Elephants that are at risk of culling or euthanasia. Using this keystone species, they raise awareness about conservation issues facing elephants and other wildlife, as well as conservation efforts in general, in an evolving and industrializing Africa. It also aims to foster a deeper understanding of elephants among humans for their future conservation. Located on the 288-hectare Vaalwal Farm, the facility currently cares for seven trained elephants. These elephants are allowed to roam freely on the property under the supervision of trained

handlers until they are guided back to their stables for the night at around 5 or 6 pm. The property also hosts other free-roaming animals such as zebras and giraffes. Activities involving direct contact between elephants and the public include elephant spa sessions, walks, and interactive experiences, all designed to educate guests on elephant anatomy, behaviour, mental abilities, and conservation efforts.

Glen Afric spans 700 hectares and offers a range of activities, including game drives, safari experiences, and elephant interactions. Home to three female elephants that are allowed to roam freely on the property under the supervision of trained handlers until they are led back to their stables for the evening around 5 or 6 pm. Volunteers and guests can walk alongside the elephants as they roam the property, with the main interaction involving elephant feeding by guests from the restaurant balcony on Sundays (about 15 minutes). The property also houses 11 lions, 4 tigers, 2 leopards, 2 cheetahs, 1 hyena, and numerous other free-roaming animals.

African Hills Safari Lodge & Spa, situated within the 6800-hectare Plumari Private Reserve in Magaliesburg, serves as a sanctuary for wildlife enthusiasts and conservation advocates. The reserve boasts rich biodiversity, including the renowned Big 5 (lions, elephants, leopards, buffalo, and rhinoceroses) among other free-roaming species. The elephants at African Hills, two majestic bulls, undergo a brief training session each morning, followed by supervised roaming around the property (from 6 am to 6 pm). Depending on guest interest, they may have up to two interactions per day (20 minutes each) and participate in a "feeding interaction" on Sundays.

Visitor surveys were administered at the Johannesburg Zoo, which is home to three elephants with different backgrounds. These unrelated elephants had unrestricted access to the outdoor area of the main enclosure and the night room, except during cleaning times. The facility includes an old enclosure, a night room, a boma, a bulk room, and a new enclosure. When this study was conducted, the old enclosure and the night room together were accessible to all the elephants every day for most of the day, except for the time dedicated to the cleaning of the enclosure when the animals were kept in the boma. In the whole enclosure, there were several big tires and poles fixed to the ground to stimulate exploration behaviour and provide the animals with additional surfaces to scratch their bodies.

The new enclosure allowed the elephants to roam freely without a fixed schedule, although not for the entire day or at night. Enrichment through training was also a part of their schedule. Each elephant had one staff member assigned to it, positioned on the outside of the boma while the elephants were inside. The training sessions, lasting approximately 15 minutes, utilized positive reinforcement training techniques.

3.2 Stakeholders' Perspective Analysis

Considering the influence of opinions, knowledge, and ethical implications on captive and semi-captive elephant management, this study aimed to analyze the perspectives of two key stakeholder groups: visitors and owners. To achieve this, we developed two distinct comprehensive questionnaires, designed to gather a wide range of data, including the stakeholders' knowledge, opinions, and ethical considerations relevant to the care, management, and conservation of captive and semi-captive elephants. By integrating these dimensions (knowledge, opinions, and ethics) the questionnaire provided a robust framework for understanding the complex interplay of factors that influence stakeholders' attitudes toward captive and semi-captive elephant management.

3.2.1 Questionnaires design

The questionnaires were developed with a focus on relevant ethical aspects. They were designed based on the three pillars of the Ethical Matrix: Well-being, Autonomy, and Fairness. A code was assigned to each ethical principle and aspect relevant to the two groups of stakeholders and linked to the questions (Table 1), formulated and tailored to explore these ethical considerations. Additionally, a demographic section was included in the questionnaires to gather background information on the respondents. The questionnaires consisted of 40 questions for owners and 29 for visitors, to which a code was assigned to make easier results analysis (V for visitors and O for owners, followed by Q a number indicating the order in the questionnaire: VQ1, VQ2, etc. and OQ1, OQ2, etc.) (see Appendix). For owners, the questionnaire also delved into aspects related to satisfaction and the work environment, their own perceived role in conservation, and opinions about current elephant management guidelines.

Table 1: Ethical aspects relevant to owners and visitors explored in the questionnaires for each pillar of the Ethical Matrix with the specific codification used.

	WELLBEING	AUTONOMY	FAIRNESS
OWNERS	**OW1** - Feeling physically and/or emotionally close to elephants **OW2** - Satisfactory experience in terms of emotional and educational opportunities **OW3** - Safe, secure and satisfactory working environment **OW5** - Avoid cognitive dissonance **OW6** -Social, economic and cultural welfare	**OA1 -** Have access to information on elephants, and conservation **OA2 -** Freedom of being physically and/or emotionally close to elephants **OA3 -** Possibility to actively contribute to elephant conservation **OA5** - Freedom to choose to see the elephants in a facility/zoo **OA6** - Professional freedom and recognition **OA7 -** Having a say in the animals' management **OA8 -** Freedom to own elephants	**OF1** - Affordability **OF2 -** Equal opportunities to be physically and emotionally close to the elephants **OF3 -** Equal opportunities to spend days pleasantly and do emotional activities **OF4 -** Equal opportunities to express opinions **OF5 -** Equal opportunities to decide about elephant management **OF6 -** Fair recognition by institutions/authorities **OF7 -** Fair laws and regulations
VISITORS	**VW1** - Feeling physically and/or emotionally close to elephants **VW2** - Satisfactory experience in terms of emotional and educational opportunities **VW3** - Safe and secure environment **VW5** - Avoid cognitive dissonance* **VW6** - Social, economic and cultural welfare	**VA1 -** Have access to information on elephants, and conservation **VA2 -** Possibility to benefit from educational and entertainment activities **VA3 -** Possibility to take part and support in projects of elephant conservation **VA5 -** Freedom to choose to see the elephants in a facility/zoo or in their natural habitat	**VF1** - Affordability **VF2 -** Equal opportunities to be physically and emotionally close to the elephants **VF3 -** Equal opportunities to spend days pleasantly and do emotional and educational activities

*cognitive dissonance could be defined as the intellectual stress or discomfort encountered from inconsistencies between beliefs or between beliefs and actions (Festinger et al., 1957).

3.2.2 Questionnaires administration
3.2.2.1 Visitors

Questionnaires were administered at the zoo on random days between August 11 and September 10 in paper format. They were distributed by trained operators during zoo opening hours, with visitors instructed not to include their names, ensuring anonymity. The operators explained that the questionnaires were for research purposes only and that would be used in aggregate form. Visitors filled in the questionnaires independently, but operators were always present and available for any questions. Respondents could freely decide to answer or not to any of the questions and to withdraw at any moment without providing a justification. Visitor questionnaires were administered in person and in paper format to guarantee confidentiality and facilitate immediate responses (Singer et al., 1995).

3.2.2.2 Owners

The questionnaires for owners were distributed by trained operators in October, November, and early December. The owners participating in the study were selected through facilities that collaborate or are in contact with the University of Padua. For this research, "owners" are defined as anyone with decision-making authority over elephant management and welfare. This encompasses a diverse group of individuals such as facility owners, facility managers, elephant managers, elephant specialists of ECASA (Elephant Care Association of Southern Africa), farm supervisors, and reserve managers. Owners were similarly asked not to provide their names, with assurances that their responses would remain anonymous and be used exclusively for research purposes. They were free to not provide answers to the questions and to leave the project at any time. Operators were available during the completion process to address any questions, but owners were expected to fill out the questionnaires independently. The owner questionnaires were administered in both paper and online formats, accommodating the preferences and convenience of each participant and ensuring a broader and more flexible response collection.

3.3 Data analysis

The data from the questionnaires were entered into two separate Excel files, one for visitors and one for owners. We assigned a code to each question and its corresponding answer, such as OQ1/OQ2, etc., for owners, and VQ1/VQ2, etc., for visitors. For responses that required a YES or NO answer, we used Y for yes, N for no, and NA for responses left blank.

In the case of multiple-choice responses (e.g., OQ6), we marked "1" where a checkbox was ticked, and "0" where it was not. Afterward, we calculated the percentages of each response, creating charts for the multiple-choice answers.

We also created a table with various comments written by the respondents and recorded personal data (age, nationality, gender, etc.). Once we set up our work on the Excel sheets, we began analyzing the collected data.

4. RESULTS AND DISCUSSION
4.1. Participants' demographic information
4.1.1 Visitors

The total number of questionnaires collected from visitors amounts to 202, providing valuable data on the age, nationality and gender distribution of the participants.

The ages of the participants varied significantly, with recorded values from 8 to 76 years, with 11 participants who chose not to answer the question regarding their age. The average age of the visitors who provided their data is approximately 31 years. This gives us an idea of the heterogeneity of the group of visitors involved in our study. The survey revealed a gender distribution among the visitors with 61.8% females (118 female visitors) and 38.2% males (73 male visitors). The survey included a question about the nationality of the respondents, which yielded a variety of answers. While most participants provided specific nationalities, a number of responses (15) were marked as "NA," indicating that those individuals chose not to disclose their nationality, while others (19) indicated not valid answers (e.g. "white", "Africa"). Figure 1 shows the results of nationality distribution among visitors.
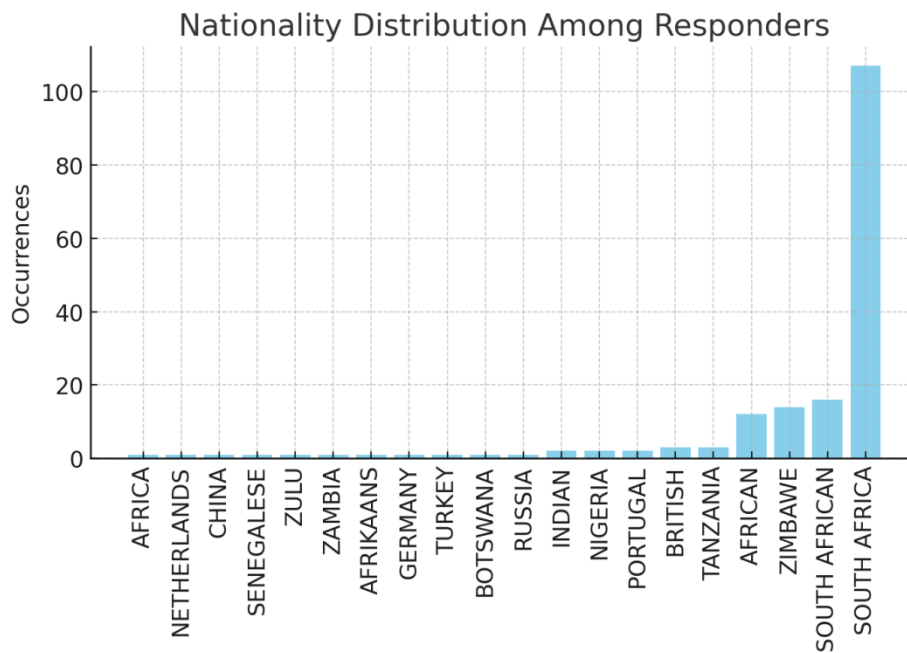
Figure 1: Nationality distribution among visitors

This analysis provides an overview of the demographic characteristics of the visitors of African elephant captive and semi-captive facilities in South Africa, based on the collected questionnaires.

4.1.2. Owners

A total of 8 questionnaires were collected for owners, providing valuable data on the age and gender distribution of the participants.

The age of the participants varied significantly, with recorded values of 40, 39, 63, 38, 28, 25, and 34 years. It is important to note that one participant chose not to answer the question regarding their age. The average age of the owners who provided their data is 38 years. This gives us an idea of the heterogeneity of the group of owners involved in our study. The survey revealed a gender distribution among the owners with 62.5% females (5 female owners) and 37.5% males (3 male owners). The survey included a question about the nationality of the respondents. Here's a visual representation of the nationality distribution among owners. This chart highlights the variety of nationalities mentioned, with a predominant number of responses identifying as "South Africa."
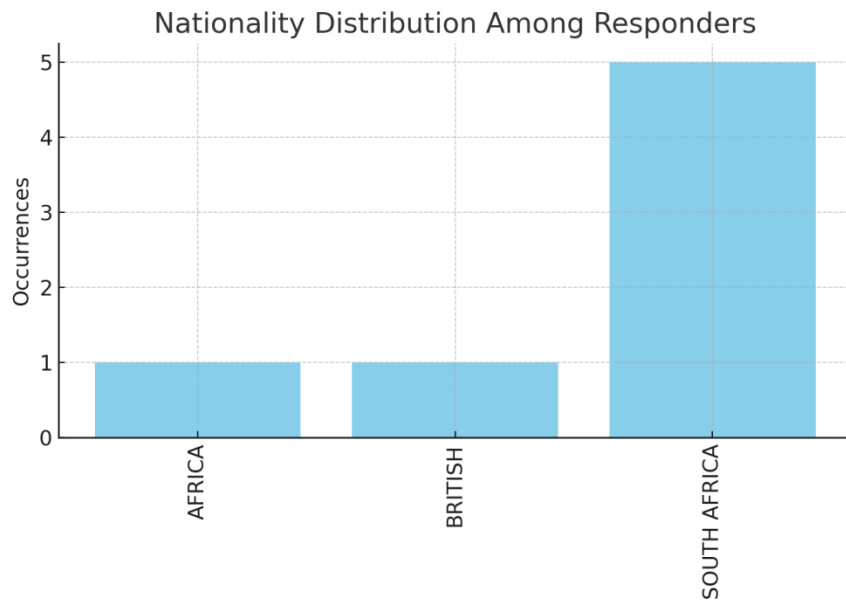
Figure 2: Nationality distribution among owners

Then participants were asked about the types of facilities their elephants are hosted in. 1 out of 8 respondents indicated their elephants are hosted in a zoo, another 1 out of 8 in a wildlife rescue center, 3 out of 8 in sanctuaries, and 5 out of 8 in private wildlife reserves. It's important to highlight that some owners selected more than one option.
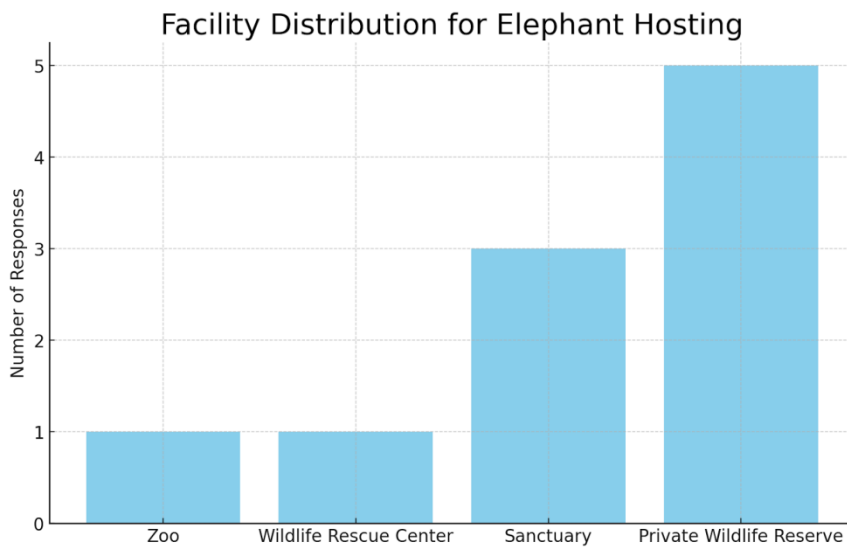

Figure 3: Type of facilities distribution for elephant hosting

One question focused on the educational background of the respondents. The responses painted a picture of a relatively well-educated group, with no participants having only a

compulsory school education or selecting "none" for their level of schooling. Specifically, 3 respondents indicated they had obtained a secondary school certificate, showcasing a basic level of formal education. Meanwhile, a slightly larger number, 4 participants, reported having a Bachelor's degree. Additionally, 1 respondent had achieved a Master's degree, indicating a further level of advanced academic pursuit.

This analysis provides an overview of the demographic characteristics of the owners of African elephants in captivity and semi-captivity in South Africa, based on the collected questionnaires.

4.2. Participants's awareness and knowledge
4.2.1 Visitors

The first question of the survey asked participants to indicate the reason for their visit to the zoo. The majority of visitors (49.01% n=99) indicated that they wanted to educate their children or themselves about animals or nature, followed by 34 visitors (16,7%) that indicated entertainment as a principal reason and 44 persons (21,7%) focused on providing entertainment for their kids and 32 respondents (15,8%) indicating they had other reasons. Through question VQ6, visitors indicated they felt to receive enough information about elephants concerning the following aspects: biology (34; 15,3%); behaviour (54; 30,7%); welfare (31; 17,6%); conservation status (30; 17%); safety measures (27; 19,3%). Question VQ7 asked respondents if they were interested in receiving more information: 10 of them replied that they were not interested; the other 89 visitors wanted to receive more info about elephants. In particular, answers were divided as follows: biology (71; 17,5%); behaviour (88; 21,7%); welfare (77; 17%); conservation status (63; 15,5%); safety measures (69; 19%). Then, participants were asked if they were familiar with the concept of elephant well-being (VQ8). The question aimed to gauge public awareness regarding animal welfare, specifically in relation to elephants. The findings from the questionnaire reveal insightful data on the respondents' familiarity with animal welfare concepts: out of the total responses collected 98 respondents, accounting for 48.51% of the total, affirmed their familiarity with the concept of elephant well-being; 92 respondents, making up 45.54% of the total, indicated they were not familiar with this concept. Additionally, 12 respondents, which correspond to 5.94% of the total, did not respond to the question. Following the initial inquiry (VQ8) about familiarity with the concept of elephant well-being, which yielded a near-even split in awareness, the

subsequent question (VQ9) sought more detailed insights from those who acknowledged some level of familiarity. Specifically, VQ9 asked respondents to identify, from a provided list, one to three aspects they deemed most crucial for assessing the well-being of captive elephants. The options for VQ9 included a range of welfare indicators that were chosen by visitors as follows: refuge provision (10) 5%, biological needs of the species (20) 10%, group size and composition (29) 14%, environmental complexity (28) 14%, possibility to express social behaviour (44) 22%, food and water provision (48) 24%, enclosure size (67) 33% and good health (77) 38%. In addition, 7% (15) of respondents selected "I do not know" and 1% (2) selected "others". Then, 32.67% (66 out of 202 respondents) of participants did not select any options for VQ9. In particular, 8 people of the 98 that declared their awareness of the animal welfare concept were unable to identify any specific aspect they deem important for assessing the well-being of elephants (VQ9). In addition to selecting from multiple-choice options, survey participants were invited to provide their own suggestions for enhancing the welfare of elephants in captivity in South Africa. Some examples, assigning them a category, are summarized in Table 2.
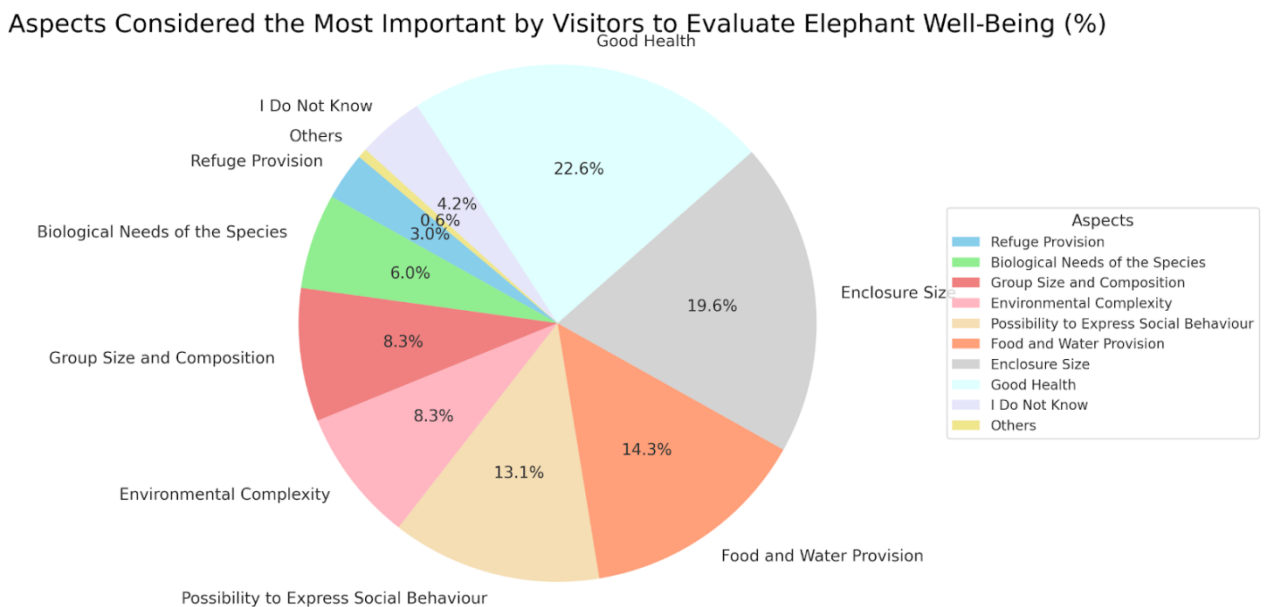

Figure 4: Aspects considered the most important by visitors to evaluate elephants well-being (VQ9)

Table 2: Visitors' suggestions for enhancing the welfare of elephants in the zoo.

CATEGORY	RECOMMENDATIONS
Enclosure Size	Enlarge enclosures to accommodate natural behaviours and provide more space.
Environmental Enrichment	Add more enrichments and toys. Introduce hiding spaces for play and privacy. Install larger mud water holes. Provide daily enrichment activities.
Natural Habitat	Mimic natural habitats as closely as possible with more trees and greenery. Surround enclosures with trees and provide leaves. Install shade areas and additional water sources. Provide running water.
Social Dynamics	Increase population size for enhanced social relationships. Advocate for larger herd sizes to improve social dynamics. Emphasize the importance of not isolating social animals.
Diet and Health	Adjust feed to match the natural diet sizes of elephants.
Educational Efforts	Suggest educational efforts about elephants. Recommend staff to educate zoo visitors about elephants.
General Improvements	Improve the aesthetics of enclosures. Call for enclosures that more closely resemble natural environments.
Ethical Considerations	Some believe elephants should not be kept in enclosures.
No Suggestions	Some respondents had no suggestions, indicated by "none."

When asked about their satisfaction with the overall quality of elephant care (VQ16), including aspects such as enclosures, space, and cleanliness, 67% (136) of respondents answered yes, 25% (50) of the participants expressed dissatisfaction by responding no. Meanwhile, 7% of the respondents did not provide an answer to the question.

Regarding captive settings (VQ11), 70% (142) of visitors reported that having the opportunity to see elephants in captivity is important and 22% (45) that this is a valuable

experience. 72 (36%) visitors had never seen elephants in the wild (VQ10) and 145 (72%) would visit a facility that does not host elephants (VQ22).

Questions VQ3, VQ13, and VQ14 asked visitors about their feelings: 165 (82%) visitors indicated that they experienced good feelings seeing elephants, 125 (62%) that they felt an emotional connection, and 106 (52%) felt a physical proximity with the animals. 153 (76%) of visitors considered important to feel close to the elephants.

Question VQ28, aimed to determine whether education influenced the perception and experience of the visitors. 63 visitors (31%) had a scientific background in animal, natural or environmental sciences or related fields; of them, 98 (49%) declared to be familiar with the concept of animal welfare in question VQ8 and 125 (62%) to feel an emotional connection with elephants.

Among the 202 participants in the survey, 107 indicated "yes" to question VQ29, inquiring about pet ownership.

Among the 107 pet owners: 79 people (approximately 73.83%) indicated they felt an emotional connection with elephants (VQ13); 23 people (approximately 21.50%) answered they did not, and 5 people (approximately 4.67%) did not provide an answer.

Correlating affirmative responses to question VQ29 (Do you have any pets?) with responses to question VQ8 (Are you familiar with the concept of elephant well-being?), we can determine if having pets influences one's awareness of animal (elephant) welfare. Out of 202 survey respondents, 107 (nearly 58%) indicated they have pets (VQ29). Among these pet owners: 62 respondents (approximately 57.94%) answered "Yes" to being familiar with the concept of elephant well-being (VQ8); 43 respondents (approximately 40.19%) answered "No" and 2 respondents (approximately 1.87%) did not provide an answer. The responses of pet owners highlighted various aspects deemed important for elephant welfare, their choices were the following: Enclosure Size: Selected by 47 individuals, accounting for 43.93% of pet owners who participated in this part of the survey. Good Health: Highlighted 51 times, representing 47.66% of the pet-owning respondents. Possibility to Express Social Behaviours: Noted 28 times, making up 26.17% of responses from pet owners. Environmental Complexity: Chosen 17 times, which is 15.89% of the pet-owning participants. Food and Water Provision: Selected 30 times, equating to 28.04% of the pet owners. Group Size and Composition: Picked 19 times, or 17.76% of pet owner responses. Refuge Provision: Considered important by 6 individuals, just 5.61% of the responding pet owners. Biological Needs of the Species:

Highlighted 16 times, accounting for 14.95% of pet owner responses. I Do Not Know: 7 respondents, or 6.54%, were unsure about what aspects were most important. Many respondents exceeded the instructed limit of three choices in VQ9.

Table 3: Percentage of visitors' answers to question VQ9 that have pets, have a scientific background and are familiar with the concept of animal wellbeing.

Aspect of animal welfare VQ9	% of pet owners VQ29 (107 visitors)	% of people with a scientific background VQ28 (63 visitors)	% of people familiar with the concept of animal welfare VQ8 (98 visitors)
Good health	47.66%	50,79%	60,20%
Possibility to express social behaviours	26.17%	26,98%	34,69%
Enclosure size	43.93%	39,68%	56,12%
Environmental complexity	15.89%	22,22%	21,42%
Food and water provision	28.04%	25,39%	36,73%
Group size and composition	17.76%	20,63%	20,40%
Refuge Provision	5.61%	11,11%	9,18%
Biological Needs of the Species	14.95%	15,87%	16,32%
I don't know	6.54%	9,52%	5,10%

4.2.2 Owners

In the survey eight elephant owners, including owners and managers, specialists and reserve managers, were asked about their work with elephants, their work satisfaction and if they are free to behave as they want.

75% (6 out of 8) reported working with elephants on the day of the survey, while 25% (2 out of 8) did not. All respondents who worked with elephants that day (100% of the 6) expressed happiness and satisfaction with their work.

When asked about feeling safe around the elephants, 87.5% (7 out of 8) responded positively, with one owner not responding. Regarding the freedom to behave as expected during daily care, 75% (6 out of 8) felt they could, while 25% (2 out of 8) did not.

The response to question OQ5 which asked if they think that there is enough and easily accessible information about elephants for owners (e.g. biology, behaviour, welfare indicators, etc.) reveals a significant divide. Half of the elephant owners (50%) expressed the belief that they do not receive adequate information.

The subsequent question OQ6 (Would you like to receive more information about: multiple-choice answer) delves deeper into their specific areas of interest for further information, crucial for understanding the precise knowledge gaps or areas of interest among elephant owners.

The responses to OQ6 reveal a detailed perspective on the topics where these owners seek more insights: half of the respondents (4 out of 8, or 50%) expressed a desire for more information on elephant biology; 4 (50%) about elephant behaviour; 5 (63%) about elephant welfare; 4 (50%); conservation status 3 (38%) and 4 (50%) about safety measures.

Notably, a minority (1 out of 8, or 12.5%) expressed no interest in receiving further information.
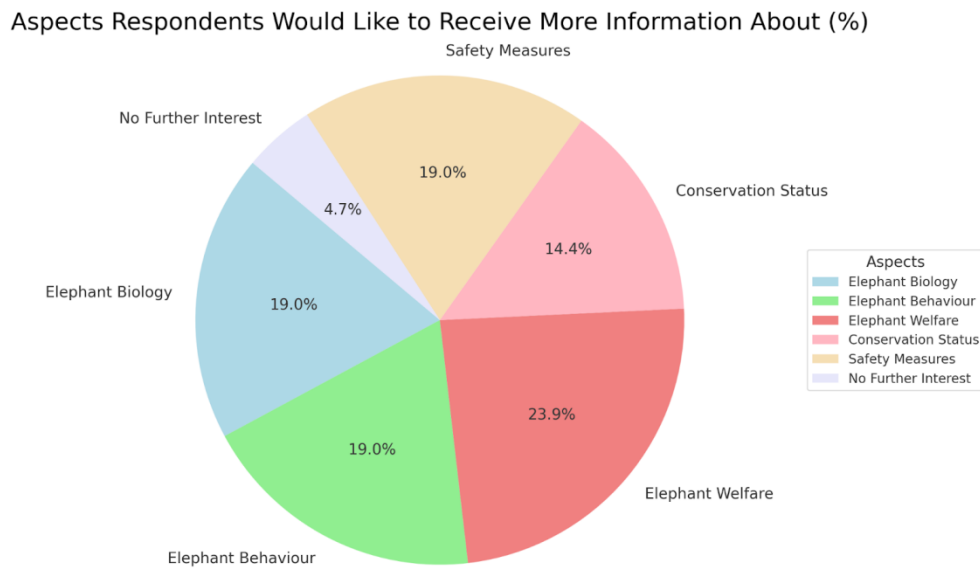
Aspects Respondents Would Like to Receive More Information About (%)

Figure 5: Percentage of owners' answers regarding what they would like to receive more information about (OQ6).

Digging into how elephant owners feel about their role and voice in elephant care, three areas were explored: decision-making autonomy, feeling heard in the broader management context, and freedom to express opinions on elephant well-being.

Concerning autonomy in making decisions (OQ7), 75% of respondents (6 out of 8) affirmed they feel empowered to make such decisions. However, the remaining 25% (2 out of 8) reported feeling restricted. When asked if their opinions are considered in the context of elephant management (OQ8), the responses were evenly split, with only 37.5% (3 out of 8) believing their perspectives are fairly acknowledged and the other 37.5% (3 out of 8) believing their opinions are not fairly considered. 25% (2 out of 8) of respondents chose not to respond to this question.

Lastly, regarding the freedom to express opinions on elephant management and well-being (OQ9), a similar 75% (6 out of 8) felt at ease sharing their views. The other 25% (2 out of 8) felt that they were not free to express an opinion about elephant management/well-being in South Africa. A similar question, about elephants' well-being, asked respondents if they think they have a role in it (OQ15): 100% (8 out of 10) indicated that they think they have a role in elephants' well-being. Regarding the freedom of owning elephants, nearly all respondents (7 out of 8, 87.5%) did not feel their freedom was limited (OQ25). When asked about their role in elephants' conservation, the majority (5 out of 8, 62.5%) affirmed their involvement, two

(25%) denied having a role, and one (12.5%) did not respond (OQ28), highlighting varied perceptions of their contribution to conservation efforts.

Owners' responses to questions about management guidelines (OQ10, OQ11, and OQ12) shed light on their awareness, interpretations, and perceptions of these regulations. All respondents (8 out of 8) confirmed that they are aware of elephants' management guidelines in South Africa (OQ10). However, one of the respondents added that he has not been consulted, so he has no idea which (guideline) is relevant.

 75% (6 out of 8) of the respondents find the guidelines clear and straightforward (OQ11). Yet, there's a notable minority, the remaining 25%, who struggle with interpreting these guidelines.

The perspective shifts notably when discussing the nature of these guidelines and regulations (OQ12). A majority, again 75% (6 out of 8), perceive the guidelines as too restrictive. On the flip side, a scant 12.5% (1 out of 8) view the guidelines as fair and balanced. One of the respondents decided not to answer this question.

Regarding the concept of elephant well-being (OQ13), all eight respondents affirmed their familiarity and they provided thoughtful responses to the subsequent question OQ14 (If yes, choose one to three aspects that you consider the most important for evaluating captive elephants' well-being).

The distribution of their prioritizations is as follows: good health was emphasized by 7 out of 8 respondents (87.5%); food and water provision was chosen by 5 out of 8 respondents (62.5%); the possibility to express social behaviours by 4 out of 8 respondents (50%); biological needs of the species by 2 out of 8 respondents (25%); the enclosure size by 1 out of 8 respondents (12.5%); environmental complexity by 1 out of 8 respondents (12.5%). One owner elaborated further his/her answer, emphasizing both mental and physical health, including the biological needs of food, water, and the opportunity to express and practice natural behaviours.

Aspects That They Consider the Most Important for Evaluating Captive Elephants' Well-Being (%)
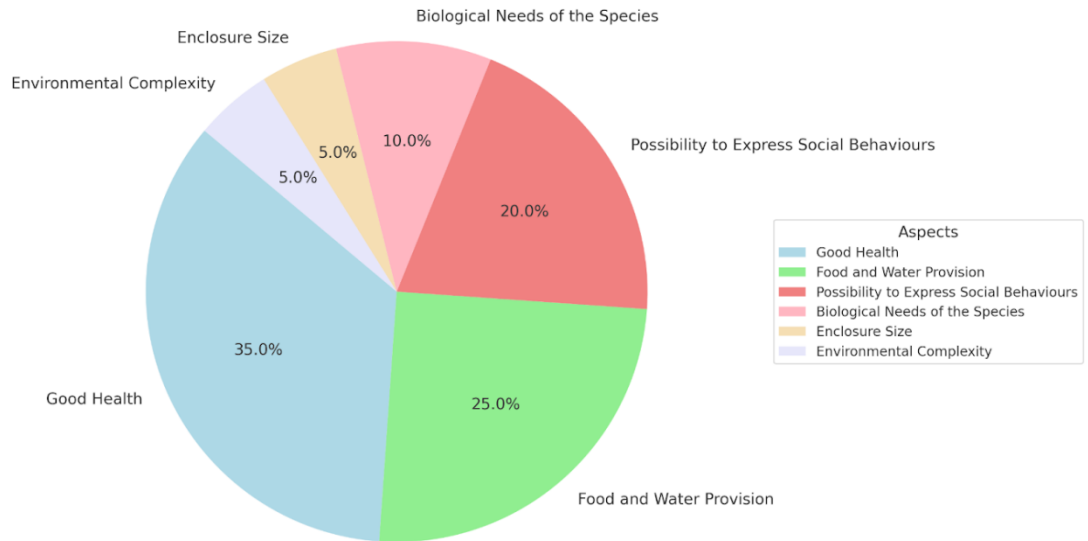

Figure 6: Percentage of owners' answers concerning the three aspects that they consider the most important for evaluating captive elephants' well-being (OQ14)

4.3 Ethical aspects

We used the Ethical Matrix (EM) as ethical tool to consider the different aspects involved in this case study. The EM is useful for the decision-making process (Biasetti et al., 2021). This approach involves rephrasing specific statements to fit broader ethical principles or categories. These categories are: Autonomy, Well-being, and Fairness. This process helps ensure that all relevant ethical considerations are identified and assessed across the standard ethical principles (Biasetti et al., 2021).

4.3.1 Autonomy

Autonomy encompasses the ability to make choices and exercise freedom in aspects fundamental to an individual's identity, such as their profession, cultural practices, and traditions (Biasetti et al., 2021) Therefore, autonomy is deeply interconnected with the provision of comprehensive and accurate information to all stakeholders, ensuring their capacity to act freely and with full understanding of their actions (Jamieson et al., 2008).

For example, question VQ6, which inquires whether respondents believe they received sufficient information during the visit on biology, behaviour, welfare, conservation, and safety

measures, aims to explore whether their opportunity to access information on elephants and conservation (VA1-Autonomy, Table 1) during the visit was respected, and what specific areas they received the most information on. However, upon reviewing the comments to question VQ6, it becomes evident that numerous visitors are not satisfied with the information received, or that they received none at all. Another instance highlighting visitors' autonomy can be found in question VQ19: "Will you talk to your family/friends about elephants?". An overwhelming 86% of visitors responded affirmatively to this question, indicating their willingness to engage in conversations and spread awareness about elephants, highlighting that their autonomy of choice and action is linked with the possibility of taking part and supporting elephant conservation projects (VA3-Autonomy, Table 1). Question VQ19 is closely linked to question VQ20, which asked, "Will you support elephant conservation (e.g., volunteering, donating money)?". A significant majority of respondents (79%) expressed their intention to support elephant conservation, underscoring the importance of providing them with this opportunity. The final example illustrating visitors' autonomy is found in question VQ22: "Would you visit a facility that does not host elephants?" This question holds significance as it reflects their freedom to choose between viewing elephants in a facility/zoo, observing them in their natural habitat or visiting a facility that does not host elephants (VA5-Autonomy, Table 1). 72% of respondents answered affirmatively, emphasizing their autonomy in making choices regarding their zoo/facility visit experiences.

Regarding the autonomy of owners, examples can be found in questions OQ10 and OQ11: "Are you aware of elephants' management guidelines in SA?" and "Do you think elephant management guidelines are clear and easy to interpret?" In the first question, all respondents and the majority of them in the second responded affirmatively. This indicates that they have access to information on elephants and conservation (OA1-Autonomy, Table 1). Closely related to questions OQ10 and OQ11 is question OQ12 concerning their opinion about guidelines and regulations. The majority of owners (75%) replied that they find them "Too restrictive," suggesting their perceived autonomy in making decisions about elephant management could be affected by current guidelines and regulations. Another example is found in questions OQ26 through OQ29 inquiring whether owners usually discuss about elephants with family and friends, disseminate information about their conservation, believe to have a role in elephant conservation, and actively support species conservation through actions such as volunteering or donating money. The majority of owners responded positively

to these questions, indicating that their possibility to actively contribute to elephant conservation (OQ3-Autonomy, Table 1) is fairly respected. Half of the respondents felt they are fairly considered in elephant management in South Africa (OQ8), indicating that for them professional freedom and recognition (OA6-Autonomy, Table 1) and having a say in the animals' management (OA7-Autonomy, table 1) are respected, while the other 50% felt not considered and recognised. However, in question OQ9 about feeling free to express an opinion about elephant management and well-being, the majority (75%) answered yes, suggesting that while the freedom to express opinions is not denied, it may still be inadequately considered. This is reflected in question OQ25, where 88% of owners indicated that their freedom to own elephants is somehow limited (OA8-Autonomy, Table 1).

4.3.2 Well-being

In the Ethical Matrix, well-being is defined by two core aspects: physical health and functioning, and the balance between positive and negative emotional states, the latter only applicable to sentient beings (Biasetti et al., 2021). Human well-being within the realm of ethics encompasses not only psychological and physical well-being but also extends to broader ethical considerations that impact individuals' social, cultural, and economic lives (Chatfield et al., 2018). The use of the ethical matrix as a tool to navigate and address ethical challenges demonstrates its value in analyzing the implications of various technologies and practices on human well-being (Mepham et al., 2000). Both visitors and owners indicated they felt safe being close to the elephants (VQ4 and OQ3), with respectively 93% of visitors and 88% of owners indicated they felt safe. This strongly suggests that their well-being regarding safety (VW3-Wellbeing and OW3-Wellbeing, Table 1) has been positively respected. Another example of visitors' well-being is found in question VQ3, which asks if they experienced good feelings while seeing the elephants. 82% of visitors answered yes, indicating a strong feeling of being physically and/or emotionally close to elephants (VW1-Wellbeing, Table 1). Also, owners indicated feeling physically close to the elephants and in addition, owners felt free to behave as they desired or expected during the daily care of the elephants (VQ4), 75% of respondents provided positive feedback. This affirms their ability to feel physically and/or emotionally connected to elephants (OW1-Wellbeing, Table 1) while avoiding cognitive dissonance (OW5-Wellbeing, Table 1)

Question VQ18, "Do you think about elephants as an important cultural symbol?", received 88% positive responses from visitors and 63% (VQ30) from owners, indicating a strong feeling of social, and cultural welfare associated with elephants (VW6-Wellbeing, OW1 AND OW3-Wellbeing, Table 1). In response to questions VQ21 for visitors "Do you consider seeing captive elephants a valuable experience for yourself?", nearly all visitors (88%) responded positively. This indicates that they feel this to be a satisfactory experience in terms of emotional and educational opportunities (OW2-Wellbeing, Table 1).

4.3.3 Fairness

Fairness entails the equitable recognition and respect for the inherent value of every individual and their role within the community, ensuring just and impartial treatment and equal opportunities for all (Qing-guo., 2009).

Question VQ18 aims to understand whether respondents believe the price they paid for entry to the zoo was fair. The majority (88%) responded affirmatively, indicating an incredible affordability that can create more opportunities for people to visit the zoo (VF1-Fairness, Table 1).

At question VQ16, "Are you satisfied with the overall quality of elephant care (e.g., enclosures, space, cleaning, etc.)?", just over half of the visitors responded positively (67%). This suggests a good opportunity to spend days pleasantly and engage in emotional and educational activities (VF3-Fairness, Table 1). Question OQ24 aims to assess owners' perceptions regarding the fairness of their acquisition of an elephant. This inquiry seeks to understand the affordability of elephant ownership. With 88% responding affirmatively (with the remainder not responding), this indicates a widespread perception that the process for becoming an elephant owner is fair, suggesting accessibility and affordability (OF1-Fairness, Table 1). The responses (63% positive) to question OQ23, "Are you satisfied with the overall quality of elephant care in your facility (e.g., enclosures, space, cleaning, etc.)?", indicate that owners perceive equal opportunities to be physically and emotionally close to the elephants (OF2-Fairness, Table 1), as well as equal opportunities to spend days pleasantly and engage in emotional activities (OF3-Fairness, Table 1). However, some owners express that there is potential for further enhancement. In question OQ12, owners had to indicate their opinion about elephant management guidelines and regulations. with the majority of responses

indicating "too restrictive" (75%), suggesting that owners do not believe the laws and regulations are fair (OF7-Fairness, Table 1).

4.4 Discussion and Conclusion

Our study aims to investigate the ethical considerations of both visitors and elephant owners using questionnaires, as well as their opinions and knowledge. These two stakeholder categories are recognized as the most important, with owners' decisions directly impacting elephant welfare (Chadwick et al., 2017). Analyzing owners' opinions with a structured methodology can provide science-based information about ethical implications for elephant management, offering insights into personal views that may influence managerial decisions (Young, 2011). Additionally, this study examines how visitors perceive elephants, and animal welfare in zoological facilities. Visitors play a crucial role in supporting conservation projects sustained by facilities, making their opinions influential for the future of species conservation (Ballantyne et al., 2009; Cousins et al., 2009). The questionnaires aimed to investigate the three pillars of the Ethical Matrix, well-being, autonomy, and fairness, through key aspects related to individual questions. For example, they delved into safety and emotional connections with animals, as well as access to information for both visitors and owners. Additionally, they examined fairness in terms of affordability for visitors and professional freedom and satisfaction for owners, ensuring a comprehensive assessment of these ethical considerations.

Visitors bring a lot of expectations and values to their visits, seeking not only entertainment but also educational experiences that deepen their understanding of wildlife and conservation issues (Ballantyne et al., 2007). By asking visitors to indicate the reasons for their zoo visits, we have uncovered that a significant majority (49%) attend for educational purposes. This finding suggests a fertile ground for environmental education activities, highlighting potential opportunities for outreach and awareness campaigns. However, despite this inclination towards educational visits, it appears that many visitors (49%) did not receive enough information during their zoo experience. However, the majority of visitors express a desire for more information specifically about elephants. This majority represents a promising opportunity for educational initiatives. Implementing educational programs and interpretive displays can effectively inform visitors about the importance of elephant conservation, the

threats facing elephants in the wild, and the role of captivity in species preservation (de Mori et al, 2019). Moreover, zoological facilities can play a pivotal role as advocates for elephant conservation which aligns with their mission (Hacker et al., 2016). By engaging in public outreach and advocacy efforts, these facilities can promote policy changes and funding initiatives aimed at preserving elephant habitats and contrasting illegal wildlife trade (Kelling et al, 2019). Through these initiatives, zoos can emerge as influential voices in elephant conservation, using their position to effect meaningful change (Sterling et al., 2017). Despite visitors' desire to gain nuanced insights into the components of elephant well-being, a significant portion (32.67%) of survey respondents did not select any options for the question about their opinions on the most crucial aspects of evaluating the welfare of captive elephants (VQ9). This suggests a notable gap in specific knowledge or confidence among participants in identifying the key factors influencing elephant welfare in captivity, potentially indicating a lack of in-depth understanding or specific knowledge regarding the implications and contributing factors to the welfare of captive elephants. Analysis reveals that participants with a scientific educational background tend to exhibit greater familiarity with the concept of elephant well-being compared to the overall distribution of responses. This suggests that education in related fields can indeed heighten awareness of animal welfare as discovered by Zemanova et al., 2023. Moreover, the majority of these educated participants view observing elephants in captivity as a valuable experience and report feeling emotionally connected to the animals. This suggests that an educational background may not only enhance knowledge about elephant well-being but also enrich the observational experience, providing context and understanding that may be lacking in visitors without such educational backgrounds. Interestingly, despite possessing specific knowledge, some participants with scientific educational backgrounds did not recognize the importance of elephant well-being or reported feeling an emotional connection. This discrepancy could stem from a range of personal opinions or past experiences that shape individual perceptions, regardless of educational attainment (Knight et al., 2009). Studies have shown that when visitors feel a connection to the animals they observe, they are more likely to participate in conservation behaviours, such as making donations, adopting sustainable practices, or advocating for wildlife protection (Brando et al., 2017). Visitors' suggestions for enhancing the welfare of elephants in the zoo collectively highlight a strong demand for improvements in the physical and social environments of captive elephants. The emphasis on larger and more natural enclosures underscores the widespread recognition of the importance of spaces that allow

elephants to engage in natural behaviours, such as roaming and socializing. Moreover, the frequent mention of water, both as a feature of the enclosure and for drinking, underscores the recognition of the significance of hydration and bathing to elephant welfare. A study on the welfare-based design of a new habitat for Asian elephants at the Oregon Zoo highlighted the importance of providing a complex, flexible space that encourages activity and promotes species-typical behaviours. This habitat design included considerations for water availability for drinking and bathing, supporting the idea that access to water is integral to enhancing elephant welfare by enabling natural behaviours and social dynamics (Gleaser et al., 2021). The call for more enrichment and natural elements like trees, plants, and shade reflects an understanding that mental stimulation and comfort are vital for the well-being of these animals (Claxton et al., 2011) and thus, for a better visitors' experience (Robinson et al., 1998). Furthermore, suggestions for educational initiatives and dedicated staff to inform visitors about elephants point to a desire for increased awareness and understanding of elephants among the public. This is a positive indication of public engagement and interest in elephant welfare. Interestingly, the responses also reveal a tension between the desire for better conditions within captivity and a fundamental questioning of the ethics of captivity itself. Comments suggesting that elephants should not be enclosed but are important for their conservation highlight this dilemma.

The data also reveals a compelling correlation between pet ownership and the emotional connection felt towards elephants. Notably, a significant majority of pet owners (73.83%) report feeling emotionally connected to elephants. Previous studies, such as Daly et al., 2006 and Gujarathi et al., 2021 have found that owning a pet can have a positive impact on the development of empathy and the emotional well-being of individuals, suggesting that experiences with pets can influence the way people perceive and relate to wildlife and other aspects of the natural world. However, it's essential to acknowledge that approximately 21.50% of pet-owning respondents did not perceive an emotional connection with elephants, potentially indicating that pet ownership alone does not guarantee such a bond, as highlighted by Daly et al., 2006. Additionally, the 4.67% of non-responses may reflect uncertainty or indifference towards the issue. These findings underscore the complexity of human-animal relationships and the varied responses they evoke, which could be investigated in future studies. Despite this, nearly 58% of pet owners demonstrate awareness of the concept of elephant well-being, suggesting that pet ownership may indeed be associated with heightened sensitivity to animal welfare issues. The link between owning pets and familiarity with

elephant well-being reinforces the idea that personal experiences with animals can cultivate awareness of broader animal welfare concerns, including those of wild or captive animals like elephants (Gujarathi et al., 2021). However, it's noteworthy that a significant portion (42%) of pet owners reported not being familiar with elephant well-being, potentially indicating that pet ownership alone does not guarantee awareness of specific animal welfare concepts.

The data from owners' questionnaires showed a generally positive experience among those working closely with elephants, highlighting areas of satisfaction and safety, alongside a note for potential improvement in ensuring all individuals feel completely free in their interactions. The survey targeting owners and managers of African elephants in South Africa, a unanimous acknowledgment of elephant well-being was observed, contrasting sharply with the varied responses from visitors. Regarding the concept of elephant well-being (OQ13), all eight respondents (100%) affirmed their familiarity and they provided thoughtful responses to the subsequent question (OQ14) which asked them to choose one to three aspects that they consider the most important for evaluating captive elephants' well-being. The emphasis on good health as a primary concern highlights the foundational importance of physical wellness in captivity. The significant focus on the ability to express social behaviours and the provision of food and water aligns with a broad understanding of the complex needs of elephants, including their social nature and basic survival requirements. Interestingly, the less frequent mentions of enclosure size and environmental complexity might indicate a belief among some owners that while space and complexity are important, they may not be as immediately impactful on well-being as health, nutrition, and social opportunities. The lack of emphasis on group size, composition, and refuge provision suggests these are not seen as pressing issues within this specific community (Glaeser et al., 2021).

The singular response under "Other" underscores the necessity of an integrated approach to welfare, linking mental health directly with physical health and the fulfillment of biological and behavioural needs. This comprehensive perspective highlights the importance of a well-rounded approach to captivity that mirrors the natural conditions and behaviours of elephants as closely as possible (Mehrkam et al., 2020). Overall, these insights point towards a consensus among elephant caretakers on prioritizing health, nutrition, and social interaction as key to the well-being of captive elephants, while also recognizing the importance of environmental and psychological considerations. This knowledge base could serve as a starting point for further investigating owners' perspectives and management practices while posing a critical foundation for developing and implementing best practices in elephant care and welfare.

The responses to OQ6 reveal a detailed perspective on the topics that these owners want to know more about, indicating a significant interest in understanding the physical and genetic aspects of elephants, crucial for their proper care and management. 50% of them expressed the willingness to know more about elephant behaviour, This underscores the importance of comprehending the social structures, communication methods, and individual behaviours of elephants, which is vital for creating environments that cater to their natural inclinations and needs. 63% were interested in acquiring more knowledge about elephant welfare. This points to a conscientious concern for the ethical treatment, health, and overall well-being of elephants under their care. 37.5% indicated an interest in the conservation status of elephants. This interest reflects a broader concern for the survival and protection of elephants in the wild, underscoring the global context of elephant management and conservation efforts. 50% of the owners wish to receive information on elephant safety measures. This highlights the practical concerns related to ensuring the safety of both elephants and humans in managed care settings. Notably, a minority (12.5%) expressed no interest in receiving further information. This response could reflect confidence in their current level of knowledge or satisfaction with the information already available to them.

Our results revealed a nuanced view among elephant owners and managers in South Africa. While a perceived high level of autonomy and freedom to express opinions, suggested a strong sense of personal agency and responsibility in their roles, as well as unanimous awareness of management guidelines, there seemed to be mixed feelings about the fairness of how opinions are considered within the management framework. Additionally, there is a significant perception (75%) that the guidelines are too restrictive, which, combined with concerns about the fairness of opinion consideration and clarity of the guidelines for some, may suggest that some areas of the regulatory framework could be improved. This insight highlights a critical gap in the availability or accessibility of comprehensive knowledge on elephant care and welfare. This sentiment underscores a tension between regulatory intentions and practical application, hinting at possible constraints that could impact the flexibility needed in elephant management. Future studies could investigate the needs and suggestions of the stakeholders involved in elephant management. It can be done using different approaches; for instance, participatory processes may help foster a more inclusive dialogue among stakeholders in the elephant management ecosystem, while improving animal welfare (Truelove et al., 2020; Muzzo et al., 2023).

When asked if they find that guidelines are clear and easy to interpret 75% answered positively, which is crucial for ensuring that the rules are followed as intended and that elephant welfare is consistently prioritized. Yet, there's a notable minority, the remaining 25%, who struggle with interpreting these guidelines. This discrepancy signals a potential gap in how information is conveyed. The implication is twofold: firstly, it points to a potential need for improved dissemination of existing information or resources on elephant biology, behaviour, and welfare; secondly, it may indicate areas where current knowledge is incomplete or not sufficiently tailored to the practical needs of those responsible for the day-to-day care of elephants (Williams et al., 2018; Mason et al., 2010).

The complex picture shaped by our results about stakeholders' opinions found its basis in the ethical principles. Concerning owners, there seems to be a strong sense of autonomy and professional freedom and a unanimous acknowledgment of their role in ensuring the well-being of elephants. However, owners seem to perceive a gap in how their opinions are considered within the broader management framework. The unanimous awareness of management guidelines contrasts with mixed feelings about their restrictiveness and the clarity with which they are interpreted. Confirming this, a study indicated that guideline clarity is crucial for enhancing care quality, appropriateness, cost-effectiveness, and serving as educational resources (Kish et al., 2001). The near-universal feeling (88%) of being restricted in owning elephants (OQ25) suggests that the regulatory environment, viewed as too restrictive by many (75%), oversteps the fundamental ability to own and manage elephants. However, the mixed responses regarding their role in conservation (OQ28) highlight a potential area for increasing engagement and awareness among owners and managers, emphasizing the importance of integrating conservation goals with management practices (Conway et al., 1995). The acknowledgment of a role in both elephants' well-being and conservation by a majority, coupled with the perception of regulatory restrictiveness, suggests a readiness among owners and managers to engage in responsible elephant management and conservation efforts. However, it also indicates a need for dialogue between these stakeholders and regulatory bodies to ensure that guidelines are both effective in achieving conservation goals and practical for those directly involved in elephant care (Young et al., 2011).

In conclusion, our study sheds light on the complex dynamics surrounding elephant management and welfare, drawing insights from both visitors and owners/managers' opinions in South Africa. Future steps will aim to complete the Ethical Matrix by further

analyzing the answers and context and considering animals as stakeholders. This approach aligns with recognizing wild animals as active participants in wildlife conservation and management, emphasizing the need to account for animal individuality, sociality, and relationships with humans. Encouraging a more inclusive approach to stakeholder engagement, this perspective considers animals themselves as stakeholders, whose behaviours and needs must be integrated into conservation planning (Edelblutte et al., 2022). Our approach of investigating opinions, knowledge, and cultural aspects alongside a preliminary ethical analysis ensures an integrated approach to the ex-situ management and conservation of elephants. Only by applying an integrated and inclusive approach to conservation, understanding stakeholders' opinions, values, and needs (Wells et al., 2004) together with a comprehensive understanding of the biological, behavioural, environmental, and conservation needs of African elephants we can develop effective programs for their long-term well-being and survival (Roisin Stanbrook, 2018).

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6. APPENDIX

Table 4: Visitors' questionnaire

Nr.	Question	Type	Ethical matrix
1	Why are you visiting the zoo: [ ] To entertain myself [ ] To entertain my children [ ] To educate children/myself about animals/nature [ ] Other	Multiple-answer multiple choice	VW1 VW2 - Wellbeing VF3 - Fairness
2	Did you see the elephants today?	yes/no	VW1 Wellbeing VF2 VF3 Fairness
3	If yes, did you experience good feelings while seeing the elephants?	yes/no	VW1 Wellbeing VF2 VF3 Fairness
4	Did you feel safe being close to the elephants' enclosure?	yes/no	VW3 - Wellbeing
5	Do you think there is enough information about elephants in the zoo?	yes/no	VA1 - Autonomy
6	In your opinion, during your visit, did you receive information about [ ] Elephant biology [ ] Elephant behaviour [ ] Elephant welfare [ ] Elephant conservation status [ ] Elephant safety measures	Multiple-answer multiple choice	VA1 - Autonomy
7	Would you like to receive more information about [ ] Elephant biology [ ] Elephant behaviour [ ] Elephant welfare [ ] Elephant conservation status [ ] Elephant safety measures [ ] I am not interested in receiving more information	Multiple-answer multiple choice	VA1 - Autonomy

8	Are you familiar with the concept of elephant well-being?	yes/no	VA1 - Autonomy
9	If yes, in your opinion, what are the three most important points to evaluate captive elephants' well-being? [ ] Enclosure size [ ] Good health [ ] Possibility to express social behaviours [ ] Environmental complexity [ ] Food and water provision [ ] Group size and composition [ ] Refuge provision [ ] Biological needs of the species [ ] I do not know [ ] Others Do you have a suggestion on how to improve elephants' welfare in captivity in SA? Please write:	Open-ended	VA+VW+VF
10	Have you ever had the chance to see a non-captive elephant?	yes/no	VF2 - Fairness
11	Generally speaking, do you think having the opportunity to see elephants in captivity is important?	yes/no	VF2 - Fairness
12	Do you consider seeing captive elephants a valuable experience for yourself?	yes/no	VW2 - Wellbeing VF3 - Fairness
13	Do you feel an emotional connection with elephants?	yes/no	VW1 - Wellbeing
14	Did you feel physically close to the elephants?	yes/no	VW1 - Wellbeing
15	Did you feel free to behave as you wanted/expected during your visit?	yes/no	VW1 VW5 - Wellbeing
16	Are you satisfied with the overall quality of elephant care (e.g., enclosures, space, cleaning etc.)?	yes/no	VW1 - Wellbeing VF2 VF3 - Fairness

17	Do you consider it important to feel close to the elephants?	yes/no	VW1 - Wellbeing
18	Do you think the price you paid is fair?	yes/no	VF1 - Fairness
19	Will you talk to your family/friends about elephants?	yes/no	VA3 - Autonomy
20	Will you support elephant conservation (e.g., volunteering, donating money)?	yes/no	VA3 - Autonomy
21	Do you think about elephants as an important cultural symbol?	yes/no	VW1 VW6 - Wellbeing
22	Would you visit a facility that does not host elephants?	yes/no	VW1 - Wellbeing VA5 - Autonomy
23	If you wish to add anything to allow better interpretation of your answers or if you wish to add anything at all, please use the space below.	Open-ended	W + A + F
24	If you wish to receive updates about this study, write to ....or leave your contact in the free space below. Your contact (optional):_____		W+A+F
DEMOGRAPHIC INFORMATION			
25	Age: _____	Open-ended	Segment respondents' group by age
26	Nationality: _____	Open-ended?	Segment respondents' group by nationality
27	Gender:	Single-answer multiple choice	Segment respondents' group by gender

	Female		
	Male		
	Prefer not to say		
	Other _____		
28	What is the highest certified level of education you have completed? o Compulsory school o Secondary school certificate o Bachelors degree o Masters degree o PhD/Higher degree o None	Single-answer multiple choice	Segment respondents' group by educational level
29	Do you have any educational background in animal or natural or environmental sciences/related fields? o Yes o No	yes/no	Segment respondents' group by educational background
30	Do you have any pets? o Yes o No, but I would like to have pets o No, I am not interested in having pets o I had in the past	Single-answer	Segment respondents' group by pet ownership

Table 5: Owners' questionnaire

Nr.	Question	Type	Ethical matrix
1	Did you work with elephants today?	yes/no	OW1 Wellbeing OF2 OF3 Fairness
2	If yes, were you happy and satisfied working with the elephants?	yes/no	OW1 Wellbeing OF2 OF3 Fairness
3	Did you feel safe being close to the elephants?	yes/no	OW3 - Wellbeing
4	Did you feel free to behave as you want or expect during the daily care of the elephants?	yes/no	OW1 OW5 - Wellbeing OA6 - Autonomy
5	Do you think there is enough and easily accessible information about elephants for owners (e.g. biology, behaviour, welfare indicators etc.)?	yes/no	OA1 - Autonomy
6	Would you like to receive more information about [ ] Elephant biology [ ] Elephant behaviour [ ] Elephant welfare [ ] Elephant conservation status [ ] Elephant safety measures [ ] I am not interested in receiving more information	Multiple-answer multiple choice	OA1 - Autonomy
7	Do you feel free to decide about the well-being and management of your elephants?	yes/no	OA7 - Autonomy OF5 - Fairness
8	Do you feel your opinion to be fairly considered in elephant management in SA?	yes/no	OA7 OA6 - Autonomy OF5 OF6 - Fairness
9	Do you feel free to express an opinion about elephant management/well-being in SA?	yes/no	OA7 OA6 - Autonomy
10	Are you aware of elephants' management guidelines in	yes/no	OA1 - Autonomy

	SA?		
11	Do you think elephant management guidelines are clear and easy to interpret?	yes/no	OA1 - Autonomy
12	Do you think elephant management guidelines and regulations are: • Too restrictive • Fair and balanced • Too permissive	Single-answer multiple choice	OA1 - Autonomy OF7 - Fairness
13	Are you familiar with the concept of elephant well-being?	yes/no	OA1 - Autonomy
14	If yes, in your opinion, what are the three most important points to evaluate captive elephants' well-being? [ ] Enclosure size [ ] Good health [ ] Possibility to express social behaviours [ ] Environmental complexity [ ] Food and water provision [ ] Group size and composition [ ] Refuge provision [ ] Biological needs of the species [ ] I do not know [ ] Others Do you have a suggestion on how to improve elephants' welfare in captivity in SA? Please write: _____ _____ _____	Open-ended	OA OW OF
15	Do you think you have a role in elephants' well-being?	yes/no	OW2 - Wellbeing OA3 - Autonomy

16	Have you ever had the chance to see a non-captive elephant?	yes/no	OF2 - Fairness
17	Generally speaking, do you think having the opportunity to see elephants in captivity is important?	yes/no	OF2 - Fairness
18	Do you consider seeing captive elephants a valuable experience for yourself?	yes/no	OW2 - Wellbeing OF3 - Fairness
19	Do you feel an emotional connection with elephants?	yes/no	OW1 - Wellbeing OA2 - Autonomy OF2 - Fairness
20	Do you consider it important to feel emotionally close to the elephants?	yes/no	OW1 - Wellbeing
21	Do you feel physically close to the elephants?	yes/no	OW1 - Wellbeing OA2 - Autonomy OF2 - Fairness
22	Do you consider it important to feel physically close to the elephants?	yes/no	OW1 - Wellbeing
23	Are you satisfied with the overall quality of elephant care in your facility (e.g., enclosures, space, cleaning etc.)?	yes/no	OW1 - Wellbeing OF2 OF3 - Fairness
24	Do you think the way you became an elephant owner is fair?	yes/no	OF1 - Fairness
25	Do you feel your freedom of owning elephants is somehow limited?	yes/no	OA8 - Autonomy
26	Do you usually talk to your family/friends about elephants?	yes/no	OA3 - Autonomy
27	Do you usually disseminate information about elephants and their conservation?	yes/no	OA3 - Autonomy
28	Do you think you have a role in elephants'	yes/no	OA3 - Autonomy

	conservation?		
29	Do you support elephant conservation (e.g., volunteering, donating money)?	yes/no	OA3 - Autonomy
30	Do you think elephants are an important cultural symbol?	yes/no	OW1 OW6 - Wellbeing
31	Would you visit a facility that does not host elephants?	yes/no	OW1 - Wellbeing OA5 - Autonomy
32	If you wish to add anything to allow better interpretation of your answers or if you wish to add anything at all, please use the space below.	Open-ended	W + A + F
33	If you wish to receive updates about this study, write to ………….or leave your contact in the free space below. Your contact (optional):_____		W+A+F
DEMOGRAPHIC INFORMATION			
34	Age: _____	Open-ended	Segment respondents' group by age
35	Nationality: _____	Open-ended?	Segment respondents' group by nationality

36	Gender:
	
	    Female
	
	    Male
		Single-answer multiple choice	Segment respondents' group by gender

	Prefer not to say Other _____		
37	In which type of facility are your elephants hosted? • Zoo • Wildlife rescue center • Sanctuary • Private wildlife reserve	Single-answer multiple choice	Segment respondents' group by type of facility
38	What is the highest certified level of education you have completed? o Compulsory school o Secondary school certificate o Bachelors degree o Masters degree o PhD/Higher degree o None	Single-answer multiple choice	Segment respondents' group by educational level
39	Do you have any educational background in animal or natural or environmental sciences/related fields? o Yes o No	yes/no	Segment respondents' group by educational background
40	Do you have any pets? o Yes o No, but I would like to have pets o No, I am not interested in having pets	Single-answer	Segment respondents' group by pet ownership

	o I had in the past		