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The dynamics of the online wildlife trade in mammalian species on Instagram and Facebook in
Indonesia

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Abstract

The wildlife trade is an ongoing issue for wildlife, conservationists, and law enforcement around the world and it stimulates billions of dollars each year mostly illegally. This thesis focuses on the online wildlife trade (OWT) and the dynamics behind the developed system that is rapidly growing in accordance with internet usage. This research utilizes Grounded Theory which is a method of developing hypotheses and theories that dictate the future course of the research throughout data collection and analysis. A social media investigation on the OWT was conducted on Instagram and Facebook in Indonesia between 2018-2019 and 2021-2022 in two separate trials identifying 386 social media profiles run by 264 unique actors, reflecting the presence of the OWT detailed in the literature. The trade chain revealed differences in actors, wildlife product, supply methods, and geography. Over 104 different species and 16,392 individuals from the mammalian focal orders Carnivora, Dermoptera, Diprotodontia, Pholidota, and Primates were found for sale. Of this, 93.7% of the trade involved native species of Indonesia, 40.5% of trade was determined to be illegal based on Indonesian law, and 22.4% involved threatened species telling there's a heavy local trade with questions of legality but still a small amount of international trade. In reference to geography, 69% of the sellers lived in Java, Indonesia and international trade indicated links to Africa, Asia, and South America. Social network analysis (SNA) found 10 separate supply groups (SG) (SG1-SG10) involving 38.6% of the focal group that operate together revealing the expansion of networks on social media. Roughly 15% of profiles were deleted by the social media platforms with policies against the OWT, indicating a smaller than ideal response to its presence, and sellers post they are aware that this happens. Marketing in the OWT revealed that most sellers (40%) branded themselves as a business, receiving a higher profile reach and engagement rates on their content, and reporting their marketing strategies are effective. An assessment of welfare conditions showed that 39.0% of photographs or videos displayed images that violate the Five Freedoms of animal welfare and although this data is limited due to being behind a screen, it still highlights visible negative welfare conditions. This research adds information about the dynamics of the OWT to the literature which could support others in developing research, conservation marketing campaigns, and intervention strategies.

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485 Terminology and abbreviations

Terminology/abbreviation	Definition
Actor	A person in the wildlife trade that plays a particular role or service
Branding	The promotion of a particular product or business using marketing techniques
Buyer	An actor in the wildlife trade that purchases wildlife or wildlife products
Caption	A Social Networking Service (SNSs) that allows users to pair text with media
Co-branding	The marketing of a product or service by two or more brand names
Collector	An actor in the wildlife trade that collects wildlife or wildlife product
Comment	A Social Networking Service (SNSs) that allows users to respond to a social media post
Consumer market	A system where consumers buy a particular product or service
Consumption	The using of a resource (i.e., wildlife or wildlife product)
Content Marketing	Marketing that involves the sharing of a particular product or service not focused on branding but rather the content
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	An international convention between governments that ensures the international wildlife trade does not threaten species' survival
Critically Endangered (CR)	An IUCN Red List category that labels species with a high risk of extinction in the wild that has lost 90% or more of their population and the cause is known
Demand	The force that directs the desire for certain wildlife or wildlife product
Demand elasticity	The ratio of the percentage change in quantity demanded of a product to the percentage change in price
Design flexibility	The ability of a product or service to change over time to meet different needs and requirements
Endangered (EN)	An IUCN Red List category that labels species with a high risk of extinction in the wild that has lost over 80% of their population and the cause is not known
Engagement rate	A measure of how much an audience actively engages with content
Flow of information	The system of passing information among actors in the wildlife trade
Flow of money	The system of passing money among actors in the wildlife trade
Flow of product	The system of passing product among actors in the wildlife trade
Grounded theory	The construction or hypotheses through the collection and analysis of data
Hunter	An actor in the wildlife trade that captures wildlife from the wild

Illegal wildlife trade (IWT)	Wildlife trade that is illegal under the laws of a particular country or against CITES regulations
International Union for Conservation of Nature and Natural Resources (IUCN)	An international organization that works in the field of nature and sustainability; defines species' threat status
Least Concern (LC)	An IUCN Red List category that labels species with an abundant population and very little threat of extinction
Legal wildlife trade	Wildlife trade that is legal and does not break any laws and reports to CITES if applicable
Like	A social networking service (SNSs) that allows users to like social media posts published by other users
Market power	The power of the market to decide which wildlife or wildlife product is traded
Multi-scale sampling	The methodology of sampling data multiple times in different multi-scale sampling
Near Threatened (NT)	An IUCN Red List category that labels species not yet threatened by extinction but expected to be in the future
Offline connections	Connections made offline (i.e., in person) between actors in the wildlife trade
Online connections	Connections made online between actors in the wildlife trade
Online wildlife trade (OWT)	Wildlife trade on the internet, social media platforms, or the dark web
Post	A Social Networking Service (SNSs) that allows users to publish content (i.e., text or media data) on their social media profile
Product Marketing	A marketing technique that focuses on the product and its journey to the market
Rebranding	The process of changing a business' brand with a new angle
Rekber	A third-party actor in the wildlife trade that facilitates the exchange of money between actors
Reseller	An actor in the wildlife trade that buys wildlife or wildlife product only to sell it themselves
Seller	An actor in the wildlife trade that sells the wildlife or wildlife product to other actors
Social media	Platforms on the internet that facilitate the sharing of information among users
Social Networking Services (SNSs)	Different services on social media that allow users to interact, share information, and communicate
Sourcing	The act of acquiring wildlife or wildlife product through either wild-sourcing or captive breeding
Supplier	An actor in the wildlife trade that supplies wildlife or wildlife product to other actors
Supply Group	A group of actors in the wildlife trade that supply wildlife or wildlife product to other actors
Trade chain	A system comprised of several actors that play different roles in the wildlife trade process
Trade deal	The deal made between actors in the wildlife trade to trade wildlife or wildlife product

Transporter	An actor in the wildlife trade that transports wildlife product between actors
Unregulated wildlife trade	Wildlife trade that is not reported to CITES or regulatory bodies
Use and trade	Defines the way wildlife product is used when traded (pet, food, research, etc.)
User	People that create social media profiles to publish content
User-generated content	Any content (i.e., text, media, etc.) published by people
Vulnerable (VU)	An IUCN Red List category that labels species with a 50% decrease in their population if the cause is known or a 30% decrease in population size if the cause is not known

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Chapter 1: Introduction

1.0. Introduction to thesis

This thesis investigates the online wildlife trade (OWT) of mammalian species in Indonesia on Instagram and Facebook (Stringham et al., 2021 (1)). The wildlife trade is a threat to wildlife species globally, and over the last decade the OWT has added to the already growing number of actors in the trade and increased the number of individuals involved (Feddemma et al., 2021; Nijman et al., 2019 (1)). More specifically, the OWT is a problem because it has expanded the wildlife trade tremendously with new opportunities and network growth using the internet, allowing buyers and sellers to reach one another in an easier way, and introducing new buyers that have never used physical marketplaces. This thesis provides new information on the OWT, an issue discussed below, that leads researchers and conservationists aimed at stopping the wildlife trade in a new direction (Sung & Fong, 2018). As the OWT grows, and the Internet usage in Indonesia becomes more expansive, research focused on this issue is becoming more important (Di Minin et al., 2019; Fedemma et al., 2021; Siriwat & Nijman, 2018). This research will focus on identifying the dynamics, social media and marketing aspects, and the individual welfare concerns found in this study (Davies et al., 2022 (1); Fedemma et al., 2021; Woolloff et al., 2022).

1.1. Global wildlife trade

The wildlife trade is a multi-billion-dollar industry that involves the selling or exchange of wild animals and/or plant products (Sung & Fong, 2018; World Bank, 2008). This industry removes wildlife from its natural habitat and places individuals into captive settings, effecting population sizes and threat levels (IUCN, 2024; Patel, 2015; Pavlidou, 2018). These are species that are also threatened by pollution or habitat destruction for commercial development, agriculture, production and mining, or transportation services (IUCN, 2024; Patel, 2015; Pavlidou, 2018). Wildlife involved in the wildlife trade can be used as pets, tourist attractions, food, traditional medicine, goods, or specimens (Harrington et al., 2021; Moloney et al., 2021; Moorhouse et al., 2015; Moorhouse et al., 2020). Wildlife is traded between actors, individuals, or businesses involved in the wildlife trade network until its destination point, and the buyer drives the

519 demand of certain wildlife products to implement a desired use (Feddema et al., 2021;
520 Lavorgna & Sajeve, 2021; Pires et al., 2016; Rayburn et al., 2020). Understanding the
521 consumption methods is helpful to researchers and scientists involved in wildlife protection
522 efforts that target consumers to slow the wildlife trade or replace it sustainably (Thomas-
523 Walters et al., 2021). The wildlife trade is bolstered by poverty, food insecurity, habitat loss, low
524 enforcement, weak regulations, insecure borders, and corruption (Di Minin et al., 2019;
525 Farhadinia et al., 2019; Nijman, 2010; van Uhm & Moreto, 2018). Wildlife is a source of income
526 for most participants (McNamara et al., 2016), and some depend on it as a food source
527 (Teodoree, 2022), while other uses and demand include pets, tourism, traditional medicine, and
528 goods (decoration, jewelry, etc.). In Indonesia, and for this study, live animals are used for pets
529 (Nijman, 2010). Corruption among law enforcement paired with low enforcement rates also
530 allow the practices to continue (Wyatt et al., 2018). Uddin et al., (2024) explains that
531 knowledge such as the species traded, the sources of wildlife product, and the system or routes
532 taken to trade wildlife is critical to its reduction (Uddin et al., 2024).

533

534 The global wildlife trade has traditionally taken place in physical marketplaces (Nijman et al.,
535 2022 (2)). Recently, the wildlife trade has had an online presence that when paired with the
536 physical marketplaces, increases the degree of wildlife trade in general, and offers an
537 opportunity to implement methods that differ from research done in physical marketplaces
538 (Masters et al., 2022; Patel, 2015; Sung & Fong, 2018). This research provides insight into the
539 online wildlife trade (OWT) and details the dynamics of this system including information on the
540 trade chain, species traded, actor's geographical location, and the social network system
541 (Demeau et al., 2019; Di Minin et al., 2019; Nijman, 2022; Sirait et al., 2018). Social media also
542 serves as a dynamic of the OWT by playing a role as the setting the OWT occurs on, and
543 marketing strategies are being used in a business-like fashion on these platforms (Highfields &
544 Leaver, 2015; Walker et al., 2019). Finally, the OWT allows researchers to investigate welfare
545 conditions as a dynamic through inspection of the media used on posts and this insight helps us
546 understand what the individuals face when traded which could influence future legislation
547 (Ashley et al., 2014; D'Cruze & Macdonald, 2015; Patel, 2015).

1.1.1. Legality and legislation

Based on legality, the wildlife trade can be divided in two ways: 1) the legal wildlife trade; and 2) the illegal wildlife trade (IWT) (Nijman et al., 2022 (1); Tittensor et al., 2020). The legal wildlife trade is the trade of wildlife that is not protected, listed, or referenced in wildlife trade regulations made by regulatory bodies in the trade country or the trade of regulated, protected wildlife that meets the guideline (Andersson et al., 2021; Stringham et al., 2021 (1)). Each country develops wildlife trade regulations based on the local species' (i.e., local trade) threat of extinction and the intensity that the wildlife trade has on this threat (CITES, 2024). Generally, they create legislation based on national interests and future prevention of threatened species (CITES, 2024; Sung & Fong, 2018). The International Union for Conservation of Nature and Natural Resources (IUCN) defines species threat level by assessing each species taxonomy, population size, threats, use in the wildlife trade, geographic range, and habitat/ecology. They then assign a Red List Category (i.e., status) used by regulatory bodies for reference (IUCN, 2024). It should be noted that IUCN categories do not always reflect the trade and assessments are based on the information available (IUCN, 2024). Status categories include Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC), and Data Deficient (DD). Species categorized as CR, EN, and VU are considered globally threatened while species categorized as NT, LC, and DD, are potentially traded but not labeled threatened (IUCN, 2024; Nijman et al., 2021). The international wildlife trade, wildlife trade between two or more countries, can involve The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)- an agreement between 184 countries that regulates the trade of 40,000 species listed in their appendices (I-III) (CITES, 2024; Doukakis et al., 2012; Esmail et al., 2019; Maldonado et al., 2009). In Indonesia, CITES considers the national legislation, details exemptions and special procedures, provides permit information, and develops export quotas (CITES, 2024). CITES is relevant to this thesis when considering evidence of an international trade in Indonesia whether they serve as an importer of non-native species into Indonesia or exporter of local species to other countries (Manzi, 2020; Nijman et al., 2023).

577 The IWT occurs when: 1) wildlife completely protected under regulations in a trade country are
578 traded; 2) wildlife protected to a degree in the trade country are traded and guidelines are not
579 met; 3) CITES-listed wildlife is internationally traded but not reported to CITES; and 4) trading
580 species not protected to a degree or in a way that is illegal based on national laws and CITES
581 regulations (Nijman et al., 2011; Nijman et al., 2022 (1); Sung & Fong, 2018; 't Sas-Rolfes et al.,
582 2019). The IWT is a large portion of the overall wildlife trade that occurs and ranks fourth in all
583 illegal crime networks in the world (Moorhouse et al., 2017; Sung & Fong, 2018). The IWT is
584 driven by buyer demand for protected species which continues to grow despite legality credited
585 to a discrepancy between regulations and social views, customs, or traditions (Moorhouse et
586 al., 2017; Sung & Fong, 2018; Verissimo & Wan, 2019). Overall, the IWT alerts regulatory bodies
587 to the need for increased conservation efforts (Moorhouse et al., 2017; Sung & Fong, 2018; 't
588 Sas-Rolfes et al., 2019; Verissimo & Wan, 2019). The Law on the Republic of Indonesia on
589 Conservation of Living Natural Resources and its Ecosystem (1990) instated Law V which states
590 that the trade of globally threatened wildlife is illegal and has a maximum 5-year prison term
591 and a \$6,720.00 fine (Law of the Republic of Indonesia, 1990; Nijman, 2022). This law states
592 that protected species are defined as: 1) plants and animals in danger of extinction; and 2)
593 plants and animals whose population is rare (The Republic of Indonesia, 1990; Nijman, 2022).
594 There are 921 species that meet this criterion listed on Indonesia's list of protected species
595 (CITES, 2024). Actions that are prohibited because of this law include: 1) catch, injure, kill, store,
596 possess, nurture, transport, and trade-in protected animals in alive condition; 2) store, possess,
597 nurture, transport, and trade-in protected animals in dead condition; 3) transport of any
598 protected animals from a place in Indonesia to other places inside or outside Indonesia; 4)
599 trade-in, store, possess leather or other parts of protected animals or goods made of parts of
600 the animals or take the out from a place in Indonesia to other places inside or outside
601 Indonesia; 5) take, damage, abolish, trade-in, store or possess eggs and/or nests of protected
602 animals (The Republic of Indonesia, 1990; Nijman, 2022). The Regulation of the Minister of
603 Environment and Forestry of the Republic of Indonesia (2018) published an updated list of the
604 protected species in Indonesia. Below, Table # lists the focal species that are illegal to trade in
605 Indonesia.

606

607

608

609 Table 1.1: The focal species protected from the wildlife trade based on the Republic of

610 Indonesia's 2018 law listing the protected species.

scientific name	common name	IUCN Red List	CITES appendices
<i>Cuan alpinus</i>	Dhole	EN	II
<i>Catopuma temminckii</i>	Asiatic Golden Cat	NT	I
<i>Prionailurus viverrinus</i>	Fishing Cat	VU	II
<i>Prionailurus planiceps</i>	Flat-headed Cat	EN	II
<i>Panthera pardus</i>	Leopard	VU	I
<i>Prionailurus bengalensis</i>	Leopard Cat	LC	I
<i>Pardofelis marmorata</i>	Marbled Cat	NT	I
<i>Neofelis diardi</i>	Sunda Clouded Leopard	VU	I
<i>Panthera tigris</i>	Tiger	EN	I
<i>Lutra lutra</i>	Otter	NT	I
<i>Arctonyx hoevenii</i>	Sumatran Hog Badger	LC	.
<i>Prionodon linsang</i>	Banded Linsang	LC	II
<i>Helarctos malaanus</i>	Sun Bear	VU	I
<i>Arctictis binturong</i>	Binturong	VU	III
<i>Cynogale Bennettii</i>	Otter Civet	EN	II
<i>Macrogalidia musschenbroekii</i>	Sulawesi Civet	VU	.
<i>Ailurops ursinus</i>	Bear Cuscus	VU	.
<i>Spilocuscus rufoniger</i>	Black-spotted Cuscus	CR	.
<i>Spilocuscus maculatus</i>	Common Spotted Cuscus	LC	II
<i>Spilocuscus papauensis</i>	Waigeo Cuscus	VU	II
<i>Manis javanica</i>	Sunda Pangolin	CR	I
<i>Hylobates agilis</i>	Agile Gibbon	EN	I
<i>Macaca fascicularis</i>	Celebes-crested Macaque	CR	II
<i>Presbytis comata</i>	Javan Surili	VU	II
<i>Hylobates lar</i>	Lar Gibbon	EN	I
<i>Presbytis natunae</i>	Natuna Island Surili	VU	II
<i>Pongo spp.</i>	Orangutan	CR	I
<i>Nasalis larvatus</i>	Proboscis Monkey	EN	I
<i>Symphalangus syndactylus</i>	Siamang	EN	I
<i>Hylobates moloch</i>	Silvery Gibbon	EN	I
<i>Nycticebus spp.</i>	Slow Loris	.	I
<i>Tarsius spp.</i>	Tarsier	.	II

<i>Presbytis siamensis</i>	White-thighed Surili	NT	II
<i>Hystrix javanica</i>	Sunda Porcupine	LC	.

Regulatory bodies need to increase enforcement initiatives and fill the loopholes in their regulations, subsequently inform or educate enforcement agencies on each regulation in its entirety, and ideally increase enforcement initiatives and secure borders to stop the IWT (D'Cruze & Macdonald, 2015; Gomez & Shepherd, 2019; Morgan & Chng, 2018; Nijman et al., 2022 (1)). Additionally, the high levels of IWT have caused an absence of data in wildlife trade databases due to the unregulated nature that makes assessments difficult (Nijman, 2020; Phelps et al., 2016). It is imperative for future research to implement methods that attempt to accurately depict the scale and scope of the wildlife trade and fill the absence data sets (D'Cruze & Macdonald, 2015; Nijman, 2020; Phelps et al. 2016; Phelps & Webb, 2015). In conjunction with enforcement initiatives, implementation of awareness initiatives reduces buyer demand for IWT products, focusing mostly on behavior change through conservation education (Fox et al., 2006; Tournier, 2015; Wallen & Daut, 2017). Recently, through increased information on specific buyer demands, initiatives are seeking collaboration with buyers that could lead to demand replacement (Doughty et al., 2019; Moorhouse et al., 2020; Pantel & Chin, 2009). Demand replacement strategies investigate buyers demand and research if substitutes can replace wildlife products (Rock & MacMillan, 2022). Its effectiveness has been noted especially when the price is lowered, and the quality is better (Rock & MacMillan, 2022).

1.2. Online wildlife trade (OWT)

The OWT is wildlife trade conducted using the Internet, a platform for actors to post wildlife products and network with one another, and more specifically, on e-commerce websites, or social media platforms (Harrington et al., 2021; Feddema et al., 2021; Siritwat & Nijman, 2018; Spee et al., 2019;). The OWT formed through technological advancement in our society, creating the opportunity for anyone to participate in the wildlife trade network by just simply using the internet (Gluszek et al., 2021; Salamat et al., 2021; Sung et al., 2021). Approximately 4.65 billion people use social media (Di Minin et al., 2019; Siritat et al., 2018). Facebook and Instagram, the most used internet platform for the OWT, will be used for this thesis (Di Minin et

al., 2019; Sirit et al., 2018). Though other platforms are used, the OWT on the dark web is reportedly low, and law enforcement has focused a lot on e-commerce websites, shifting OWT actors to social media platforms (Di Minin et al., 2019; Roberts & Hernandez-Cruz, 2017). The shift to the OWT provides actors with a platform to become more involved in the wildlife trade network and brings a level of anonymity not previously allowed in participation expansion (Davies et al., 2022 (1); Hinsley & Roberts, 2018; Sung et al., 2021; Woolloff et al., 2022). The OWT has also allowed consumer markets to form, containing thousands of actors that range from occasional to specialist, and adding new actors to the network because of the easy opportunity to participate (Davies et al., 2022 (2); Hinsley & Roberts, 2018; Nijman, 2022; Woolloff et al., 2022). The online aspect of the OWT has also added new resources and methodology for actors, increasing the demand of wildlife, and providing actors with the capability to meet the elevated demand in frequently illegal ways (La Laina et al., 2021; Sardari et al., 2022; Spee et al., 2019). Enforcement initiatives, an important factor in conservation movements as its one of the only ways actors face repercussions, have started to shift their monitoring to the OWT due to its illegal nature, but problems have risen because: 1) regulations are written for physical marketplaces and not specifically for the OWT, creating uncertainty about legality; 2) enforcement agencies do not have access to all OWT activity and private accounts limit enforcement agencies ability to enforce; and 3) actors are stressing secrecy to hide illicit activity from enforcement agencies by giving fake information or only posting selective information that uses code words (Alfino & Robert, 2020; Gao & Clark, 2014; Lavorgna & Sajeve, 2021; Woolloff et al., 2022). Understanding the new dynamics that the OWT presents is important for enforcement agencies or initiatives and there is a need for tools and resources that provide methods or information for monitoring the OWT (Alfino & Robert, 2020; Davies et al., 2022 (2); Pascual & Wingard, 2021; Stringham et al., 2021 (1)). Below, you can find the comparison of this study to five OWT reports (Table 1.2) published by TRAFFIC. These reports are important because they create a baseline for the study and highlight the importance of the OWT in Southeast Asia (Indraswari et al., 2020; Krishnasamy & Stoner, 2016; Phassaraudomsak & Krishnasamy, 2018; Phassaraudomsak et al., 2019).

Table 1.2: A comparison between this study and TRAFFIC reports focused on the OWT titled ‘Trading Faces’. It should be noted that the TRAFFIC reports only focused on Facebook Groups to gather data.

report	country	# groups or profiles	# posts	# species	# individuals
TRAFFIC 1	Malaysia	14	236	80	380
TRAFFIC 2	Thailand	32	236	9	546
TRAFFIC 3	Thailand	12	756	200	1521
TRAFFIC 4	Indonesia, Thailand, Vietnam	69	1559	.	8506
TRAFFIC 5	Singapore	44	2276	93	3354
<i>current study</i>	Indonesia	386	70508	104	16392

Dynamics of the OWT are the forces or properties used in the processes and interactions between actors, networks, and wildlife product, ranging in context, and stimulating the growth and development of the OWT system (Oxford Dictionary, 2021; Phelps et al., 2016; Spee et al., 2019). This study focuses on the dynamics of the OWT- the movement of wildlife products through actors, beginning at sourcing and ending at consumption, using different methodology with both online and offline network connections (TRAFFIC, 2015; TRAFFIC, 2022; UNDOC, 2016; World Bank Group, 2018).

1.3. Trade chain

Trade chain dynamics differ based on actors, product, supply methods (EX: online vs. offline), and geography causing variations in reports, terminology, philosophy, and published literature (International Trade Center, 2015). The trade chain structure can be seen in Figure 1.1. First, we discuss the trade-chain factors (actors, processes, flows) and then in a study-specific context, the trade chain is discussed from species-level factors, tool and setting factors, geographical factors, and end-market factors (International Trade Center, 2015).

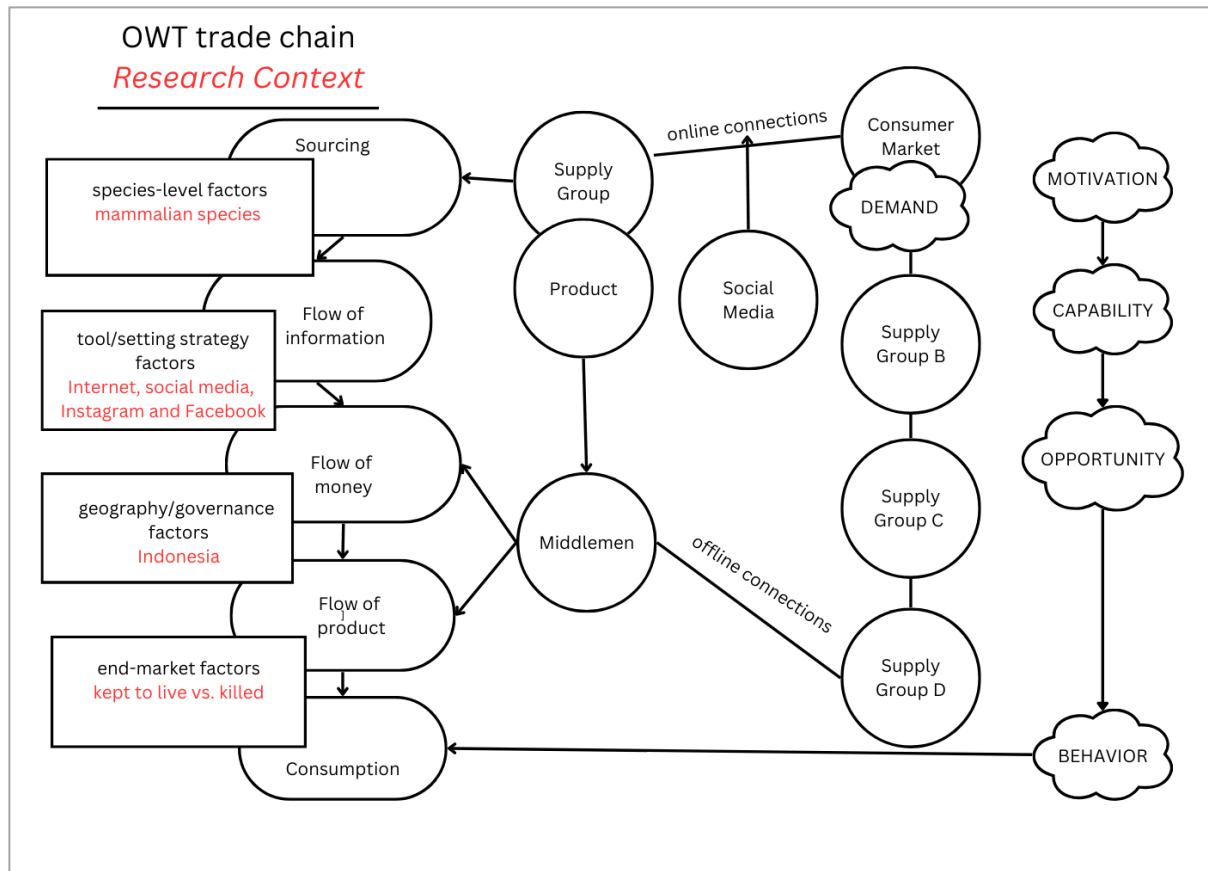


Figure 1.1: This figure represents the trade chain and the dynamics investigated in this study developed from various wildlife trade reports. It is in a research context and reflects the focal species, setting, and geographic factors of the study.

Trade chains are formed by networks of actors holding varying roles in the wildlife trade system that communicate, shape relationships, and form agreements with one another to evidently trade wildlife products (Costa, 2021; Duffy et al., 2016; Phelps et al., 2016; 't Sas-Rolfes et al., 2019). Wildlife trade networks used to be a small number of actors, mainly in one geographic area (Wyatt et al., 2020). Now, due to the OWT, networks are more complex and consist of hundreds to thousands of diverse actors (Wyatt et al., 2020). A trade chain starts with a hunter or supplier, transitioning to a seller, leading to a buyer and a third-party money coordinator, calling for a transporter, and evidently ending again at a buyer (Latinne et al., 2020; Nijman, 2022; Shepherd et al., 2018; Sung et al., 2021). The movement of wildlife products amongst actors is conducted in steps, labeled as flows and processes, that involve different goals and

methods, and form the trade chain structure. These flows and processes include: 1) sourcing- process of acquiring wildlife product; 2) flow of information- conceptual timeline of how information is created, distributed, and found; 3) flow of money- the exchange of money between actors; 4) flow of product- distribution channel of wildlife products; and 5) consumption- process of handling wildlife (live vs. dead) to achieve a desired function (Arroyave et al., 2020; Costa, 2021; 't Sas-Rolfes et al., 2019). Actors are placed into the trade chain based on their involvement in a flow or process and placement is determined by their motivations, specialties, preferences, scale of involvement, and degree of online involvement (Phelps et al., 2016).

1.3.1. Start at sourcing

Sourcing is the start of the trade chain, and this process involves acquiring wildlife products through either wild-sourcing or captive-breeding (International Trade Center, 2015; Thomas-Walters et al., 2021). Captive bred wildlife products are introduced to the trade by breeding individuals in captivity, a method commonly used by sellers and suppliers. One report shows that up to 38% of wildlife products are captive bred (TRAFFIC, 2008). Reports indicate that captive breeding, although costlier, is used by sellers to claim legality when confronted by enforcement officials (Abott & Van Kooten, 2011; Gomez & Shepherd, 2018). Some even use this technique despite products not being captive bred (Abbott & Van Kooten, 2011; Brooks et al., 2010; Gomez & Shepherd, 2018; Sy, 2017). Sourcing through captive-bred wildlife products is limited to species captive breeding success, and species that don't breed well in captivity have to be wild-sourced (Gomez & Shepherd, 2018; Musing et al., 2015). Wild-sourced products are sourced through hunting which is a process conducted by a hunter with one clear goal: acquiring wildlife and placing them in the trade (Arroyave et al., 2020; Costa et al., 2021; Latinne et al., 2020; World Bank, 2008). In most cases, sellers and suppliers create casual contract agreements with hunters (Patel, 2015; Phelps et al., 2016). One report indicates that 60% of hunters are hired and subsequently hunt in a planned, specialized way for products demanded by the seller or supplier (Harrison et al., 2016; Patel, 2015; Phelps et al., 2016; TRAFFIC, 2008). Another hunting method used is opportunistic hunting which is hunting

performed undefinedly and produces whatever wildlife product is found throughout the process (Abbott & Van Kooten, 2011; Brooks et al., 2010; Gomez & Shepherd, 2018; Musing et al., 2015). In one report, hunters reveal an increase in wildlife sourcing because of increased demand from other actors, and 58% say the development of technology for communication purposes has increased the demand (TRAFFIC, 2008). An additional 56% state the development of roads and infrastructure has increased their available supply (TRAFFIC, 2008).

Sellers and suppliers most commonly use hunters for sourcing because it is cheaper and generates a higher income (Abbott & Van Kooten, 2011; Brooks et al., 2010; Gomez & Shepherd, 2018; Musing et al., 2015). Motivations for participation can differ but studies indicate financial incentives stemming from poverty or greed is the most common (Duffy et al., 2015; Patel, 2015; Phelps et al., 2016; Thomas-Walters et al., 2021). Sellers are at the center of the trade chain, orchestrating and managing trade between all other actors (Nijman, 2022). The OWT offers sellers the ability to have online and offline relationships that are used to orchestrate the different flows and processes (Latinne et al., 2020; Lavorgna & Sajeve, 2021; Nijman, 2022). Offline relationships are with hunters, suppliers, and transporters (Lavorgna & Sajeve, 2021). Online relationships are used to form trade deals with buyers through the flow of information and the flow of money (Lavorgna & Sajeve, 2021; Nijman, 2022; Phelps et al., 2016; van Uhm & Wong, 2019). Sellers that transition to the OWT have reduced the amount of money they invest in their product as well as increased their ability to meet buyers demand (Lavorgna & Sajeve, 2021). Therefore, OWT sellers' revenue has increased by switching to online platforms (Lavorgna & Sajeve, 2021). Suppliers are actors that acquire and supply wildlife product, introducing individuals into the trade chain, and mainly for a specific demand detailed by sellers (Costa et al., 2021; Latinne et al., 2020; 't Sas-Rolfes et al., 2019; van Uhm & Moreto, 2018; World Bank, 2008). Suppliers differ in scale, and many are professional, versed, long-time, and highly connected actors (Lavorgna & Sajeve, 2021). Others are simple actors that supply wildlife product to just a few sellers in the network (Lavorgna & Sajeve, 2021). All suppliers are normally specialized and provide rare, international, or high demand wildlife products to other actors in the network (Lavorgna & Sajeve, 2021).

1.3.2. Trade Deal

A trade deal is an agreement involving three steps: 1) the seller provides the buyer with all relevant product information (flow of information); 2) the seller/buyer agree upon a financial value and method of payment (flow of money); and 3) the seller/buyer agree upon a transport method for the product that is initiated (flow of product) (Gomez et al., 2019; Harrington et al., 2021; Nijman, 2022; Phelps et al., 2016). The flow of information between sellers and buyers is open and transparent, increasing seller credibility and buyer trust (Lavorgna & Sajeve, 2021; Nijman, 2022; Phelps et al., 2016; van Uhm & Wong, 2019). The flow of money includes a third party that orchestrates the flow by holding buyers' money until the product has been received (Gomez et al., 2019; Nijman, 2022). The transferring the money to sellers is then confirmed (Gomez et al., 2019; Shepherd et al., 2018; Nijman, 2022). This system is untraceable by enforcement agencies, evidence that is needed for a prosecution, and therefore creates safety for OWT actors (Gomez et al., 2019; Shepherd et al., 2018). The flow of product is conducted by a transporter that transports wildlife by either motorcycle, bus, truck, taxi, train, plane, or boat, changing routes and disguising wildlife to avoid detection (Redford, 1992). This product flow has tremendous impacts on individual welfare of the individuals involved (Pattiselanno & Mambai, 2015; Santhanasamy & Hasan, 2018; Uprety et al., 2021).

1.3.3. Consumption

Buyers determine how wildlife products are used and traded, ultimately deciding if an individual lives, suffering lifelong consequences of poor captive conditions, or dies. OWT studies indicate that a primary use keeping species alive for use as pets, commonly involving rare or large wildlife product, but also involving species from almost every taxon (Atoussi et al., 2022; Lavorgna, 2015; Nijman et al., 2022 (2); Siriwat & Nijman, 2018). Use of live wildlife product for tourism attractions/activities is also common, providing financial benefits to local people, but causing stress and damage to wildlife individuals involved (Adams et al., 2004; Mills, 2017; Nijman et al., 2015 (1); Nijman et al., 2019 (1)). Over 150 million households reportedly rely on wildlife products in physical marketplaces or online for food and consumption, mainly due to food insecurity, malnutrition, or poverty (Bryukhova, 2021; Doughty et al., 2019; Morton et al.,

2021; Nijman et al., 2011). Cultural and traditional practices of consuming bushmeat keep the trade of this commodity high (Bailey et al., 2022). Many sellers either hire a hunter or hunt themselves to sell bushmeat in physical marketplaces and reportedly in online communities, reflecting the numbers seen in physical marketplaces (Bailey et al., 2022; Moloney et al., 2023; Onibala & Laatung, 2007). Traditional medicine is another consumption type, commonly targeting the most rare and highest priced wildlife products, evidently replacing them when availability runs out for the next rarity found and largely driven by culture and occasionally by social status (Gomez, 2021; Moorhouse et al., 2020; Morcatty, 2022). OWT wildlife products used for goods (jewelry, household, apparel, and accessories) can also occur, and this trade targets wildlife fur, skin, teeth, or bones (Harrison et al., 2016).

1.4. Species-level factors

Wildlife involved in the OWT vary based on the demand that revolves around the human perception of wildlife species (Curtin & Papworth, 2018; Smith et al., 2012; Verissimo et al., 2011; Verissimo et al., 2014). Species considered globally threatened are normally desired despite by their IUCN Red List category and protection in regulations (Sardari et al., 2022; Spee et al., 2019). Perception of rarity can develop through low species' availability and IUCN Red List category (IUCN, 2024; Patel, 2015). In turn, this increases a species involvement in the trade, concurrently increasing the perceived species' rarity, and evidently leading to a further threat of extinction (Krishna et al., 2019; Patel, 2015; Phelps et al., 2016). Perception of rarity can also develop based on the physical morphology of a species, and species that are perceived as rare are normally priced higher for trade (Nijman et al., 2019 (2)). The trade of globally threatened species often involves multiple actors from separate networks due to the barriers around the sourcing of the species (Phelps et al., 2016). On the other hand, some species are perceived as commonplace because of the high volume of individuals traded, indicating a higher population, and creates a perception of commonality- a trade that is easily conducted and almost always provided by sellers (Krishna et al., 2019; Phelps et al., 2016). Other species land somewhere in the middle, perceived as somewhat rare but also somewhat common due to their moderate availability and status (Vermont Agency of Natural Resources, 2019). In this thesis, we focus on

mammalian species from the orders Carnivora, Dermoptera, Diprotodontia, Pholidota, and Primates (i.e. focal species) (IUCN, 2024). Although not all the focal species are threatened by extinction, many of them are, and studies do focus on their presence in the OWT, but it cannot necessarily be said that it's more than other species (CITES, 2024; IUCN, 2024; Nijman et al., 2015 (2)). Below, in Figure 1.2, see the species context of five OWT reports published by TRAFFIC and compared to this study. Mammalian species were the focus of 8% of the studies followed by birds (15%), pangolins (8%), and reptiles (8%) (n=50). (Harrington et al., 2022; IUCN, 2024; Nijman et al., 2015 (2); Nijman & Shepherd, 2021).

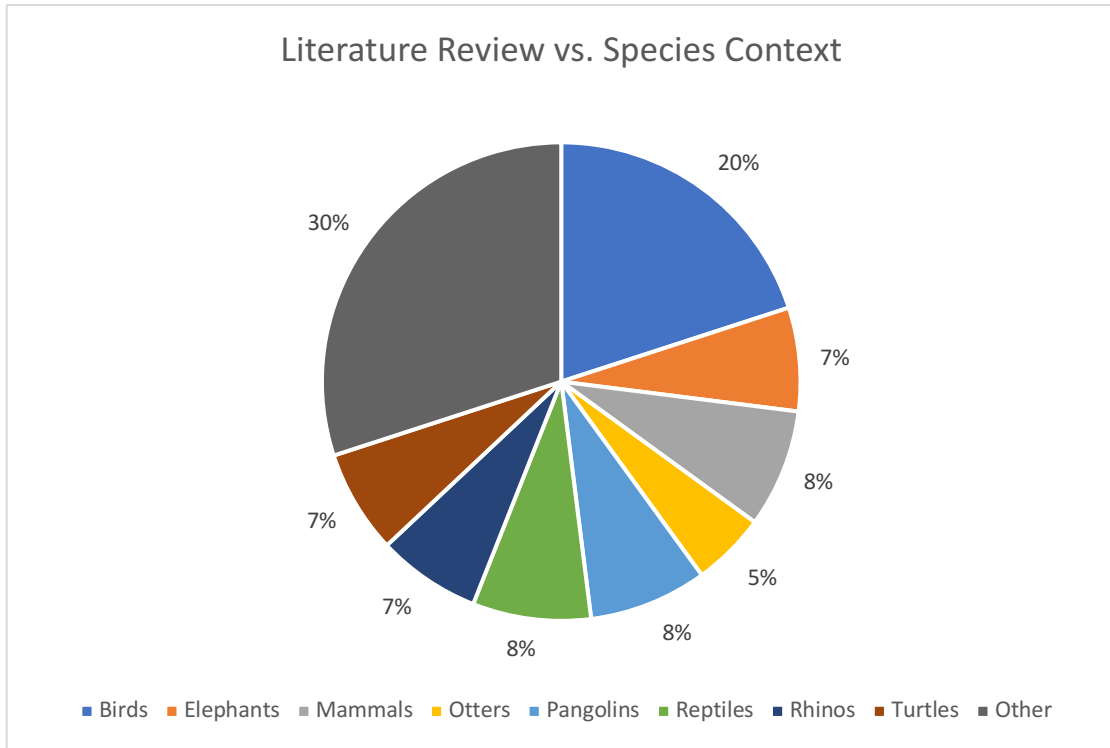


Figure 1.2: This figure represents the focal species of the top 50 studies included in the literature review and while most species are labeled under other (30%), the focal species of this study are also included (n=50).

Carnivora includes 297 species, most of which are threatened by the wildlife trade. One study highlighted that the most traded Carnivora species are from the families Mustelidae (56.7%), Viverridae (24.2%), and Felidae (8.3%) (Siriwat, 2020). This is furthered by other studies

836 (Harrington et al., 2022; Nijman et al., 2022 (1); Nijman et al., 2019 (2); Siriwat et al., 2019).
837 Prionodontidae and Ursidae are also reported by OWT studies (Gomez et al., 2019; Shepherd et
838 al., 2020; Siriwat et al., 2019). Carnivora species can be traded live or dead, and reportedly
839 traded for use as: 1) pets (Gomez, 2021; Gomez et al., 2019; Siriwat, 2020; Shepherd, 2006); 2)
840 food (D'Cruze & Macdonald, 2015; Morcatty, 2022; Shepherd, 2006); 3) medicine (Andersson et
841 al., 2021; Morcatty, 2022; Shepherd, 2006); 4) goods (i.e., jewelry, coat, jacket, decoration)-
842 claw, paw, skull, skin, fur, teeth, bone (Andersson et al., 2021; Costa, 2020; D'Cruze &
843 Macdonald, 2015); and 5) sport-hunting or specimen collecting (Gomez et al., 2019 (2); Gomez
844 & Shepherd, 2021).

845

846 There are 525 primate species, and millions of them are traded each year (Kareesh et al., 2005;
847 Nijman et al., 2011). Of those traded, it is estimated that tens of thousands are alive, and
848 millions are dead, and they are traded both locally in range countries and internationally all
849 over the globe (Kareesh et al., 2005; Nijman et al., 2011). One study indicated that primate
850 species in the OWT are slow lorises (37.7%), macaques (25.9%), langurs and lutungs (13.2%),
851 marmosets and tamarins (11.8%), and gibbons (4.7%) (Kitson & Nekaris, 2017; Musing et al.,
852 2015; Siriwat, 2020). Primates are traded for use as: 1) pets (Bergin et al., 2018; Kitson &
853 Nekaris, 2017; Nijman et al., 2009; Shepherd, 2006); 2) tourism or photo props (Bergin &
854 Nijman, 2017; Kochen, 2015; Nijman et al., 2015 (1)); 3) food (Shepherd, 2006); 4) medicine
855 (Shepherd, 2006); and 5) sport hunting or specimen collecting (Nijman et al., 2009).

856

857 The order Pholidota has only eight species, but all are extremely threatened, and thus heavily
858 traded at high prices (Bridgeland-Stephens, 2020; Bryukhova, 2021; Nijman & Shepherd, 2021).
859 Studies show that over 11 years, 143,130 pangolins were seized- a number that may be quite
860 higher considering the unseized trade (Omifolaji et al., 2022). Of those traded, 31,676 were
861 alive and 222,908 were just scales, indicating a much higher consumption of dead products
862 (Omifolaji et al., 2022). Pangolins are reportedly traded for: 1) food (Morcatty, 2022; Nijman &
863 Shepherd, 2021; Pantel & Chin, 2009; Shepherd et al., 2017); and 2) traditional medicine (Costa,
864 2020; Morcatty, 2022; Nijman & Shepherd, 2021).

There are 147 species from the order Diprotodontia, and not many reports of their trade despite the IUCN database stating they are traded for food, medicine, apparel, jewellery, and as pets (IUCN, 2024). Additionally, there are only two species of Dermoptera with very little research, and the IUCN states they are traded for food and apparel (IUCN, 2024). Whether it be their status or taxonomy, it is still important to include them in this study (IUCN, 2024). A review of this information can be seen in Table 1.1.

Table 1.3: Summary of the mammalian species investigated in this study compared to the consumption methods found in the literature. Consumption methods are taken directly from the IUCN Red List database (IUCN, 2023).

Order	# species	Consumption method
Carnivora	297	Pets, food, medicine, jewelry or decoration, sport-hunting
Dermoptera	2	Food, apparel
Diprotodontia	147	Pets, food, medicine, apparel, jewelry
Pholidota	8	Food, medicine
Primates	522	Pets, tourism, food, medicine, sport-hunting

1.5. Geographical context

The OWT has loosened geographical constraints on actors, allowing anyone to join the network despite their location, ultimately expanding local and international trade abilities for sellers, suppliers, and buyers (Nijman, 2022; Woolloff et al., 2022; World Bank, 2008). The most heavily reported OWT geographic areas are: 1) Asia (47%); 2) Africa (16%); and 3) South America (16%) (Bryukhova, 2021). It is important to understand all OWT in each geographic area, including how they are linked, and while this thesis focuses on a singular Asian country, Indonesia, there is a strong likelihood the Indonesian OWT is connected to these areas (Nijman, 2022; Woolloff et al., 2022; World Bank, 2008). Below, Figure 1.3 shows the literature review's results in a geographical context. Indonesia was the most studied country (8% of studies) followed by Thailand (6% of studies) (n=50).

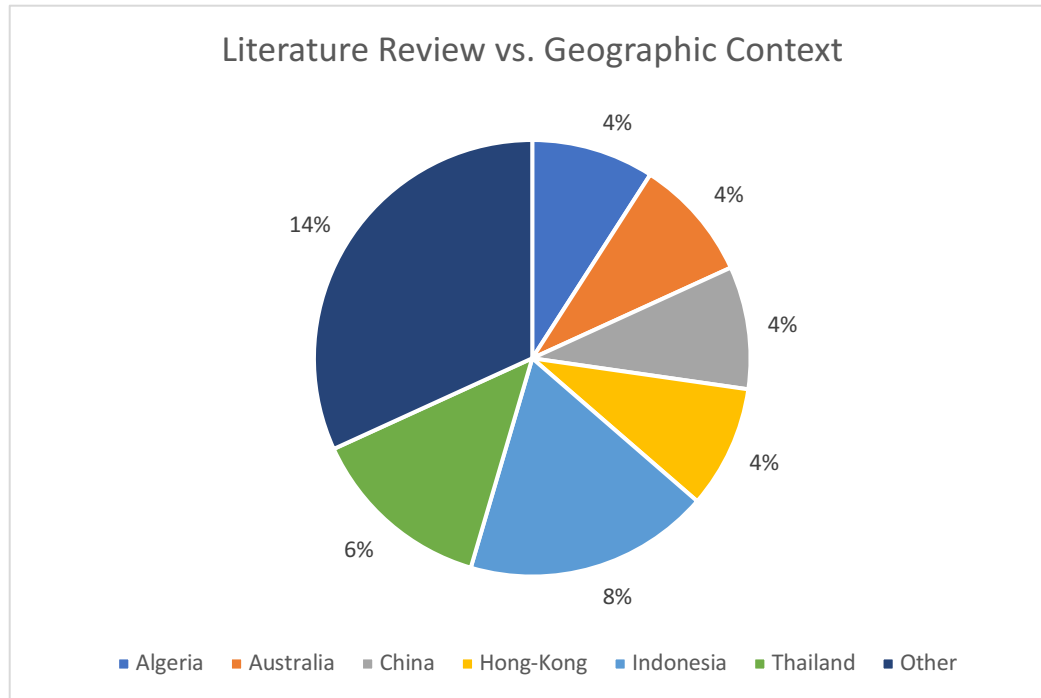


Figure 1.3: This figure represents the geographical data collected during the literature review of the top 50 OWT studies found. Although most countries are listed under other (14%), Indonesia was the second most reported country (8%).

African wildlife products are highly desired by international actors, increasing the demand for export in this area. This demand causing local actors, who commonly perceive local wildlife as a threat, to step up and meet the demand of internationally perceived rare species. Of the perceived rare species, despite low availability and protection, are easily traded due to weak regulations and corruption (Davies et al., 2022 (1); Thirgood et al., 2005). According to the literature, Africa serves as an exporter for thousands of OWT actors in Asia, Europe, and North America (Davies et al., 2022 (1); Harrington et al., 2021). OWT studies reveal Africa as a main exporter and an incredibly small importer, representing less than 6.0% of OWT in Africa (Harrington et al., 2021). The local OWT in Africa is mainly for food (Bryukhova, 2021; Harrington et al., 2021). Conservation concerns include habitat fragmentation, pollution, and over-exploitation (Atoussi et al., 2022). Wildlife is traded in Africa in street markets, pet shops, and online platforms for consumption, traditional medicine, or usage as pets (Atoussi et al., 2022; Bergin & Amezian, 2019). A study in Algeria by Atoussi et. al, (2022) found an online trade

that included over 70% CITES-listed species and highlights weak law enforcement in the area which allows this trade to occur without punishment. Even so, hunting wildlife for game in Africa is not only popular but mostly legal (Campbell & Grane, 2015). As studies report a connection between Africa and Southeast Asia (the focal area of this thesis), geography regarding sourcing in Africa will be investigated (Costa, 2021).

The wildlife trade in South America has reportedly expanded due to technological advancements, access to the global community, developed trade techniques, and a growing demand for certain species (Gluszek et al., 2021). The area has a diverse range of wildlife for both the local and international trade, including mammals and CITES-listed species (Sinovas et al., 2017). Reportedly, there is a large trade in primate species (de Souza Fialho et al., 2016; Morcatty, 2022) as well as carnivore species like Jaguars (Morcatty, 2022; Nijman et al., 2019 (1)) and other mammalian species (Beccerra et al., 2022). Although used for meat, decorative purposes, spiritual reasons, and medicinal purposes, (Beccerra et al., 2022; D’Cruze et al., 2021), studies indicate a live pet trade as well (D’Cruze et al., 2021; Kuhnen & Kanaan, 2014). South America serves multiple roles in the wildlife trade, participating in both the local and international trade as well as the legal and illegal wildlife trade (de Souza Fialho et al., 2016; La Laina et al., 2021; Wyatt et al., 2022). As an example, a study published by Nijman et al. (2019) (1) shows a positive correlation between Asian demand for jaguars ranging in South America with increased trade of jaguars in South America. Locally, market surveys indicate a trade in threatened species with declining populations and the most profitable species are at a higher risk of extinction (D’Cruze et al., 2021). In addition to physical marketplaces, studies do reveal South America’s role in the OWT, and this thesis will investigate that role regarding wildlife trade with Indonesia (Atoussi et al., 2022; Gluszek et al., 2021; La Laina et al., 2021).

Asia plays a significant role in the OWT as an exporter and an importer and mostly contributes to the IWT (Harrington et al., 2021). Southeast Asia’s OWT studies report that trade is frequently specialized for both the local and international trades, and further indicates Asia’s role as an exporter for Africa (Davies et al., 2022 (2); Santhanasany & Hasan, 2018; Nijman,

2010; Parkeh, 2020). Except for Timore-Leste (CITES, 2024), all other Southeast Asian countries are members of CITES, and studies have found that 75.7% of the OWT in Southeast Asia involves CITES-listed species (Sy, 2017). Culture has an impact on demand and in Asia, there is a local perception that the wildlife trade is sustainable, especially in common species traded more frequently. This is also true in, although less so, species deemed as rare and luxurious (Anand & Radhakrishna, 2017; Hinsley & Roberts, 2018; Spee et al., 2019). One study indicates that Malaysia, Vietnam, China, and Indonesia serve as main exporters while Japan serves as a significant importer (Nijman, 2010). The Asian OWT most likely grants more opportunity to network and provides opportunities to export or import wildlife products out of Asia or non-native species into Asia (Nijman, 2010; Siriwat & Nijman, 2018; Sung & Fong, 2018; Xu et al., 2020). Focused on Indonesia, this thesis will investigate the connections to other countries, and this likely includes other Asian countries.

Indonesia has a population of over 280 million people and is a biodiversity hot spot and an easy target for the wildlife trade (Eryan, 2024; Statista, 2022). There are over 18,000 islands in Indonesia and poaching and deforestation are reported to be the main threats (Manzi, 2020; Statista, 2022). The wildlife trade is heavily reported in Java and Bali (Manzi, 2020; Nijman & Nekaris, 2014; Nijman et al., 2015 (2); Nijman et al., 2019 (2)), and some studies indicate a large local trade (Sherman et al., 2022) while others reveal the presence of an international trade (Manzi, 2020). Other studies indicate the presence of an illegal wildlife trade in Indonesia involving protected species (Adhiasto et al., 2023; Nijman et al., 2021). Sherman et al., (2022) studied Indonesian cases of wildlife trade in orangutans and revealed that out of the 2,229 cases investigated, only 20% led to a conviction. It has also been noted that many people in Indonesia do not have concerns with the ecological impacts the wildlife trade causes or the conditions of wildlife in the trade (Nijman et al., 2024). Even so, Indonesia has recently revealed a plan to implement sustainable development goals focused on ending the trafficking of protected species and addressing wildlife demand and supply (Nijman et al., 2024). The OWT has changed the wildlife trade methods in Indonesia tremendously, and this change reportedly makes trade easier, less expensive, and lower risk- a factor highlighted by reports of local police

966 consciously placing other crimes higher in priority than the OWT (Eryan, 2024; Nijman, 2020;
967 Sirait et al., 2018).

968 Indonesia's wildlife trade encompasses many different species represented in trade studies
969 conducted in the country (Enam, 2012; Morcatty et al., 2022; Nijman et al., 2017). Carnivores
970 found within the trade system include the javan ferret badger, the common palm civet, tigers,
971 clouded leopards, otters, leopard cats, and the other nine species of civets found in Indonesia
972 (Giordano et al., 2023; Gomez et al., 2019; Nijman et al., 2019 (1); Nijman et al., 2021).
973 Indonesia has the highest primate species richness (Nijman et al., 2015 (2)), and other studies
974 highlight primate species traded including gibbons, orangutans, macaques, langurs, and slow
975 loris' (Lee et al., 2005; Morcatty et al., 2022; Nijman, 2009; Nijman et al., 2017). In one study, all
976 the orangutans and chimpanzees plus 70% of the gibbons found within the wildlife trade
977 system were infants or juvenile (Nijman et al., 2021). International primates such as
978 chimpanzees, tamarins, and marmosets are also involved in the wildlife trade and linked
979 specifically to Southeast Asia (Alexander et al., 2023; Nijman et al., 2021; Nijman et al., 2023). In
980 Indonesia, studies have shown that primates are traded for usage as pets, medicinal, and
981 decorative purposes (Manzi, 2020; Nijman & Nekaris, 2014). Studies also indicate that flying
982 foxes, cuscuses, and pangolins are traded in Indonesia (Lee et al., 2005). The reasoning for
983 trading these species includes a demand for meat, traditional medicine, or usage as pets
984 (Gomez, 2021; Mardiasuti et al., 2021; Nijman et al., 2023; Shepherd, 2010). Overall, the result
985 is a decrease in these species' population sizes, indicating heightened threats from the wildlife
986 trade (IUCN, 2024).

987

988 Sellers are always seeking security. The internet allows them to market wildlife products freely
989 while disguising their trails or using fake accounts/renaming accounts and tapping into a larger
990 network of potential or specific buyers (Nijman et al., 2021; Sirait et al., 2018). OWT sellers are
991 reportedly younger sellers that trade amongst one another and sell wildlife products for older
992 generations of sellers that are not online (Sirait et al., 2018). The OWT also changed some of
993 the buyers in Indonesia, and although some buyers still seek rare, expensive wildlife products,
994 the Internet has introduced an easier system that allows young, financially limited buyers to

participate (Sirait et al., 2018). New buyers are acting on impulse and get easily ‘bored’ with their wildlife product once the excitement winds down (Sirait et al., 2018). Ultimately, they place the individual back into the OWT system, introducing the dual role of buyers/sellers (Sirait et al., 2018). The scale of seller involvement differs, and some sellers advertise daily, advertising a range of different wildlife products (Nijman, 2022; Nijman et al., 2021). Others specialize in rare wildlife products to a degree that was not possible before the OWT, and almost half of the trade is on a smaller level, advertising only a few wildlife products they have available to them (Morgan & Chng, 2018; Nijman, 2022; Nijman et al., 2021).

In Indonesia, sellers form agreements or contracts with hunters and/or suppliers to source wildlife products that meet buyer demand and are most commonly live wildlife product or very frequently new-born or juvenile individuals (Gomez et al., 2019 (1); Gunawan et al., 2017; Morgan & Chng, 2018; Nijman et al., 2021). One study indicates that OWT sellers in Indonesia source up to 55.6% of their product from hunters, and that 80% of hunters are opportunistic while 20% are specialized (Maulany et al., 2021). The majority of product traded is wild-sourced (Morgan & Chng, 2018; Nijman, 2020), but hunters are otherwise simply mentioned (Morcattey et al., 2022). Indications are that although hunters source wildlife product for the OWT, their participation in the online aspect is low. Therefore, literature on hunters involved in Indonesian global wildlife trade was also reviewed. Sellers and suppliers that rely on hunters for sourcing wildlife product reportedly provide transportation, hunting equipment, and even food for hunting (Latinne et al., 2020; Manzi, 2020). Hunter participation is driven by financial incentives (Latinne et al., 2020). Although incentives might meet their financial needs, these incentives are also five times less than the financial incentives sellers or suppliers receive for the same product (Latinne et al., 2020). Like hunters, suppliers’ online presence in the OWT is low, and studies that mention their role suggest it involves both the local and international trade, specialized knowledge, and connections (Manzi, 2020; Morgan & Chng, 2018). In addition, studies show suppliers in the OWT are highly responsive to demanded wildlife products (Freund et al., 2017; Manzi, 2020; Maulany et al., 2021; Morgan & Chng, 2018). Studies surveying suppliers in the Indonesian wildlife trade note supplier specialties in wild-caught and CITES-listed species that are frequently exported to other parts of the world (Manzi, 2020). Other

studies report Indonesian suppliers are importers of wildlife product, and both exported and imported product indicates relationships with other suppliers (Manzi, 2020). Relationships are likely formed to meet the demand from sellers and buyers within a supplier's local network (Latinne et al., 2020; Manzi, 2020).

Flow of information from seller to buyer in the OWT is mainly in Indonesian but reportedly up to 33% can be in English, indicating a larger buyer base (Nijman, 2020; Nijman et al., 2021). Information can include wildlife products (i.e., stock), product information (i.e., ready, age, tame), location, and price (Morgan & Chng, 2018; Nijman, 2020; Nijman et al., 2021). Code words are frequently used amongst Indonesian OWT networks in the flow of information to avoid detection and potential removal of profiles. Reportedly when this strategy is not used, other sellers or buyers in the network will communicate warnings and even provide tips to avoid getting their profile taken down (Nijman, 2020; Nijman et al., 2021). Most sellers include their location when providing information online, and almost all the sellers that do indicate Java, Indonesia as their geographic location (Gomez et al., 2019; Gunawan et al., 2017; Morgan & Chng, 2018; Nijman et al., 2021). Very few sellers list prices in the OWT, instructing buyers to direct message (DM) or WhatsApp (WA) them. Of the ones that do list prices, wildlife products are priced higher when they are perceivably rare, live, international, or larger while products commonly available in the OWT are priced lower (Gomez et al., 2019; Gunawan et al., 2017; Morgan & Chng, 2018; Nijman, 2020). Rare species can be defined by lower populations, a lesser presence in OWT stocks, and an overall attraction and demand for buyers (Flather & Sieg, 2007). The OWT has increased the geographic scale of Indonesia's wildlife trade, and skilled transporters are used to conduct the flow of product from Indonesian sellers' location to quite literally any other location, and local transporters apparently rely on motorcycle taxis while international transporters rely on planes or trains (Morgan & Chng, 2018; Nijman, 2022; Nijman et al., 2021; Thomas et al., 2021). Since many transporters likely are not online participants in Indonesia's OWT, I conducted a review of Indonesia's offline general wildlife trade. This research indicates that wildlife species can be transported thousands of miles in overcrowded cages or bags and transporters use cars, trucks, busses, ferries, or boats to conduct the flow

(Maulany et al., 2021; Nijman et al., 2015 (2); Nijman et al., 2022 (1)). Once the flow of product is complete, Indonesian sellers in the OWT post ‘testimonials’ and pictures of transport methods that indicate a successful trade deal in hopes of increasing their credibility as a seller (Nijman, 2020; Nijman et al., 2021).

1.6. Social media and marketing as a force or property

Social media is an easily obtainable platform that allows actors in the OWT to share information pertinent to the OWT, broadcast their thoughts and opinions, implement marketing strategies to sell wildlife products, and use social networking services to form networks despite geographic location (Highfields & Leaver, 2015; Walker et al., 2019). Review of Indonesian OWT studies indicate Facebook and Instagram as the primary platforms used (Gomez et al., 2019; Gunawan et al., 2017; Nijman, 2022; Nijman et al., 2022 (2)), and these platforms are used by 85-86% of Indonesian’s entire population according to (Statista, 2021), Therefore, these platforms have been selected for use in this thesis. Although Facebook groups, a feature on Facebook that allows individuals to join groups of interest and collaborate, dedicated to the wildlife trade have been heavily reported (Nijman et al., 2021; Nijman et al., 2022 (2); Xu et al., 2020), this study only investigates Instagram profiles or Facebook profiles to provide balance. Facebook and Instagram both have policies against selling wildlife on their platforms (Table 1.2) as well as posting content that displays animal abuse. Violating these policies can lead to temporary bans or complete removal from the platform (Mills, 2017). Although both organizations say the OWT is strict and regulated, research indicates they are not doing enough and remain unresponsive to a large portion of the OWT seen (Kitson & Nekaris, 2017; Mills, 2017; Parekh, 2020). Even so, collaborations with wildlife organizations can be seen in Table 1.4 and these organizations ultimately help to identify and take action on photos and videos that break community guidelines (Meta, 2024). As previously mentioned, penalties usually amount to temporary bans or permanent bans from Facebook or Instagram. It is unclear however, if enforcement authorities are involved to enforce from a legal standpoint as well (Kitson & Nekaris, 2017; Mills, 2017; Parekh, 2020). Studies suggest that social media platforms rely on reporting to identify violations rather than activity looking for content themselves (Paul, 2020).

When content is reported, an alert pops up that educates viewers on the wildlife trade and the searched hashtag, post, or profile is monitored (Nicolas, 2020). Efforts from both platforms need to improve and ideally, Facebook and Instagram will collaborate in their efforts to stop the OWT, ensuring actors that are removed from one platform do not simply switch to the other (Burton et al., 2016). Collaboration could mean creating profiles with both Instagram and Facebook so that all the profiles a user participating in the OWT uses will be removed. Since 2019, Facebook and Instagram have been owned by the same company running the two platforms (Mills, 2017; Parekh, 2020). Ideal collaborations between them would mean sharing animal abuse reports, finding all of the profiles a seller has, and removing the seller from both of their platforms (Mills, 2017; Parekh, 2020). The OWT continues despite efforts, and this can be linked to the anonymity the internet provides, the network that has formed, and less consequential penalties. However, the efforts taken by Instagram and Facebook are the beginning of a necessary process to dismantle the OWT (Meta, 2024; Mills, 2017; Nijman et al., 2021; Parekh, 2020).

Table 1.4: The policies implemented by Facebook and Instagram regarding the wildlife trade on their platforms. Both platforms are owned by Facebook and therefore both platforms created similar policies in 2019.

	Facebook	Instagram
policy	Listings may not promote the buying or selling of animals or animal products, or land in ecological conservation areas.	No one may coordinate poaching or selling of endangered species or their parts.
implement year	2019	2019
partnered companies	World Wildlife Fund (WWF)	World Wildlife Fund (WWF), TRAFFIC, World Animal Protection, National Geographic

Actors involved in the online aspect of the OWT add social media as force or property first by creating profiles- an account on Facebook or Instagram that is controlled and managed by an actor. Once actors create one or more profiles on either or both platforms, the online portion of the trade chain occurs. First, actors utilize Social Networking Services (SNSs), features that

1105 allow actors to interact and communicate, starting with posts- content created and published
1106 by an actor in both text and media form that provides OWT information they would like other
1107 actors to have (Evans, 2010). Features on seller posts allow buyers to interact through these
1108 SNSs: 1) like- a way for actors to engage with a post by clicking a heart (Instagram) or thumbs
1109 up (Facebook); 2) comment- messages actors leave in response to a post; and 3) tag- a way for
1110 actors to alert other actors to posts (Feddema et al., 2020). Post successfulness is measured by
1111 engagement rates and the number of likes and comments on a post (Feddema et al., 2020) The
1112 higher a profiles engagement rates are, the more money the seller will make (Feddema et al.,
1113 2020; Fedushko & Kolos, 2019) and these rates increase based on sellers' creative strategies,
1114 persuasion tactics, and media type, ultimately indicating what content is desired and valuable
1115 to buyers (Evans, 2010; Feddema et al., 2020; Fedushko & Kolos, 2019). OWT research utilizing
1116 text and media data from SNSs has surged over the last few years and are included in this study
1117 (Kim & Seo, 2020; Walker et al., 2019).

1118

1119 Marketing strategies have frequently been used by conservations to conduct 'conservation
1120 marketing' campaigns for buyer demand reduction (Doughty et al., 2021; Duthie et al., 2017;
1121 Moorhouse et al., 2021; Verissimo et al., 2020). Only recently has the use of marketing
1122 strategies by OWT sellers become a topic of investigation (Feddema et al., 2020; Gunawan et
1123 al., 2017; Sirait et al., 2018; Xu et al., 2020). OWT sellers use social media marketing, a
1124 marketing strategy usually used by businesses to build their brand and increase sales (Evans,
1125 2010) and defined by as branding: "the process of giving meaning to your organization,
1126 business, products or services by creating and shaping a brand in buyers minds" (The Branding
1127 Journal, 2022). Each seller's developed brand is then used in the next marketing strategy-
1128 content marketing: the creation and sharing of online material (i.e., posts) that informs and
1129 educates buyers (Rowley, 2008). Content marketing and product marketing are also used by
1130 sellers through posts, and studies indicate 99.8% of sellers use both text and media to market
1131 wildlife products this way (Xu et al., 2020). The presence of wildlife on social media is known,
1132 but not always, in some cases to affect viewer perception of wildlife species, especially when
1133 human-wildlife interaction is displayed. Furthermore, this creates a perception that wildlife is

less threatened and suitable to be kept as pets, ultimately leading to increased trade in wildlife species (Kitson & Nekaris, 2017; Lenzi et al., 2020; Siriwat et al., 2020; Spee et al., 2019). Despite this, conservationists and researchers have been able to use social media to assess the public perception of wildlife species (Fidino et al., 2018; Shaw et al., 2022; Spee et al., 2019). Ultimately, the increase of public awareness of wildlife species is reducing demand (Curtin & Papworth, 2018; Verissimo et al., 2017; Wu et al., 2018). Overall, the relationship between wildlife and social media is complicated. Although social media can increase ‘pro-conservation’ behaviors in conservation initiatives, it also provides a secure, easy setting for the OWT to occur (Bergman et al., 2022). It is important for future initiatives, regulatory bodies, and researchers to consider collaboration with social media companies that are involved in the regulation of wildlife trade, combining expert opinion on the wildlife trade with expert opinion on social media to develop an effective attack on the OWT (Burton et al., 2016; TRAFFIC, 2018).

1.7. Animal welfare

For all wildlife species and throughout the entire trade chain, individual welfare is affected, and one study showed almost 80% of the time welfare is affected in a negative way (Ashley et al., 2014; D’Cruze & Macdonald, 2015; Patel, 2015). Wildlife sourced through captive breeding is sometimes unregulated, and therefore conducted by actors that are not trained and do not have the knowledge or skills to conduct such a process (Ye et al., 2020). This can impact individual welfare as well (Ye et al., 2020). During flow of product, wildlife can experience overcrowding, dehydration and starvation, infection and injury, extreme temperatures, and an overall health decline (Ashley et al., 2014; Patel, 2015). Throughout the entire trade chain, wildlife must be housed, and knowledge on each species' ecology and behavioral needs is required to sustain good welfare (Patel, 2015). The five freedoms are guidelines or freedoms for housing captive wildlife and have been used to assess welfare conditions in the wildlife trade: 1) Freedom from hunger and thirst; 2) Freedom from discomfort; 3) Freedom from pain, injury, or disease; 4) Freedom to express normal behavior; and 5) Freedom from fear or distress (Baker et al., 2013; Bergin & Nijman, 2017; FAWC, 2009). A study showed that over 80% of wildlife housed during the wildlife trade violates the five domains (another welfare measuring system)

normally due to small cage sizes in respect to species' size and natural home range (Bergin & Nijman, 2017; Ceballos-Mago & Chivers, 2010; Patel, 2015; Shepherd et al., 2004). Other factors that affect welfare during trade are unnatural feeding, human-wildlife interaction (Fuller et al., 2017; Patel, 2015). All these factors result in unnatural inter-species interaction, all of which cause stereotypic behavior in individuals- unnatural repetitive or ritualistic movement caused by stress (Bergin & Nijman, 2017; Chatpongcharoen et al., 2021; Fuller et al., 2017; Patel, 2015). Once buyers receive their product, negative welfare conditions end when individuals are killed, but for some, these conditions continue along the same process if kept alive by buyers having lasting impacts on individual welfare (Fuller et al., 2017).

1.8. Research Questions

1. What are the dynamics of the OWT in Indonesia on Instagram and Facebook and how does each dynamic play a role in the OWT?
2. How is social media used in the OWT in Indonesia on Instagram and Facebook and does marketing play a role?
3. How is the welfare of mammalian individuals in the OWT in Indonesia on Instagram and Facebook?

Above you can see the research questions that were answered in the completion of this thesis to the furthest degree possible when assessing the OWT. These questions were chosen with the idea that potential new information may contribute to the conservation of wildlife species by understanding OWT dynamics, investigating social media and marketing deeper, and assessing welfare of individuals in the trade. It is predicted that new dynamics will be found that are separate from the global wildlife trade and introduced only online. Further, it is predicted that social media, as a platform, introduces social networking services (SNSs) and marketing techniques to further a seller's place in the trade. Finally, it is hypothesized that an investigation into the OWT will reveal potential welfare concerns in the content that they publish. The logical framework can be seen below in Table 1.5.

Table 1.5: This table lists the logical framework used in this thesis as a structure for the study.

Subject	Activities	Input	Output
OWT dynamics	Literature Review	IUCN database	Profile metrics
	Social media investigation	Social media posts	Trade chain
	Multi-scale sampling	Profile biographies	Species
Social media and marketing	Web scraping	Photographs/videos	Social network analysis
	Data mining	Captions, comment, likes and tags	Supply Groups
	Data triangulation		Geographic location
	Species identification		Platform effectiveness
Welfare	Welfare assessment		Social Networking Services
			Marketing techniques
			Welfare violations

Moving forward, Chapter 2 covers the general methodology used in this study and explains the focal criteria and study parameters in the study using grounded theory (Dey, 2004; Oktay, 2012; Thornberg, 2014). Chapter 3 uses data mining and data triangulation in multi-scale sampling to assess the dynamics of the OWT which includes the trade chain, wildlife product, supply groups, and geographical locations (Feddema et al., 2020; Keskin et al., 2023; Phelps et al., 2016). Chapter 4 analyzes social media as a force or property in the OWT and investigates marketing in the OWT (Curtin & Papworth, 2018; Evans, 2010; Kachen & Krishin, 2020). Chapter 5 assesses individual welfare using the Five Freedoms and investigates wildlife nutrition, housing, health, and behavior (Mellor, 2016; Miller & Chinnadurai, 2023; Webster, 1993; Webster, 2001). Finally, Chapter 6 provides a report of the research, illustrating key points and identifying the take aways.

Chapter 2: General Methodology

2.1. Literature Review

The literature review began in 2018 by investigating the published literature on the global wildlife trade and the OWT using Google Scholar, followed by reading each of the selected publications to determine the gaps and relevancy (Auraria Library, 2024). The topics addressed can be seen in Table 2.1. Publications were put into Mendeley, a reference manager, and organized by topic for a thorough literature review. The writing portion of the literature review summarized the studies key findings and subject matter of the publications in relevancy to the thesis and identified themes, debates, and gaps to show knowledge of the subject (Auraria Library, 2024; McCombes, 2023).

Table 2.1: The terminology searched in Google Scholar when conducting a literature review focused on the topics presented in this thesis. The terminology is somewhat broad and yielded relevant results used to completion.

topic	Keywords
Online wildlife trade	wildlife trade, online wildlife trade, <i>*specific geography</i> , <i>*species names</i> , wildlife trade chain, wildlife trade network, wildlife trade communities
Social media and marketing	social media wildlife trade, wildlife trade Instagram, wildlife trade Facebook, wildlife trade marketing, social media marketing, branding, content marketing, product marketing
Animal Welfare	Animal welfare, wildlife trade welfare, the five freedoms

The OWT trade chain used in this study was created in two steps: 1) forming the trade chain structure using global wildlife trade reports from TRAFFIC, the IUCN, the United Nations Office on Drugs and Crime (UNODC), the World Bank Group, the International Fund for Animal Welfare (IFAW), the Egmont Centre of FIU Excellence and Leadership (ECOFEL), and the Financial Action Task Force (FATF); and 2) putting the trade chain structure into the context of this study. Additionally, using the IUCN Red List database, the focal species of this study were

identified, and information was gathered from both the IUCN database and the CITES appendices about the species' use and trade methods, threat and population status, and legality (CITES, 2024; IUCN, 2024). To understand the policies regarding the OWT on the social media platforms, Facebook and Instagram, the policies referencing the wildlife trade and listed on their websites were put into a relevant table (Facebook, 2024; Instagram, 2024). Studies investigating the Facebook and Instagram policies regarding the wildlife trade were also reviewed to better understand the subject (Nicolas, 2020; Paul, 2020).

More specific literature review methods were utilized to identify dynamics such as species and geography in the OWT. TRAFFIC, also known as the Wildlife Trade Monitoring Network, published five reports titled 'Trading Faces' that investigate the OWT and these were used to draw comparisons with this study using the metrics and species data available (TRAFFIC, 2024). To investigate geography in the OWT, a search was conducted on Google Scholar using the term 'online wildlife trade'. The top 50 OWT studies listed when searched were investigated from a geographical focus. Legality and legislation were investigated by reading the Republic of Indonesia's relevant laws (Republic of Indonesia, 1990; Republic of Indonesia, 2018) to determine which species are protected and the system and penalties some might face if participating. Tables and figures were created to display the results.

2.2. Focal country

Indonesia, the focal country for this study, was chosen because the OWT has been heavily reported in this area (Gunawan et al., 2017; Nijman, 2020). A map of Indonesia can be seen in Figure 2.1. The information published in previous studies, found during the literature review, paint Indonesia as an ideal focal country for this thesis (Feddema et al., 2021; Latinne et al., 2020; Maulany et al., 2021; Nijman et al., 2022 (1)).

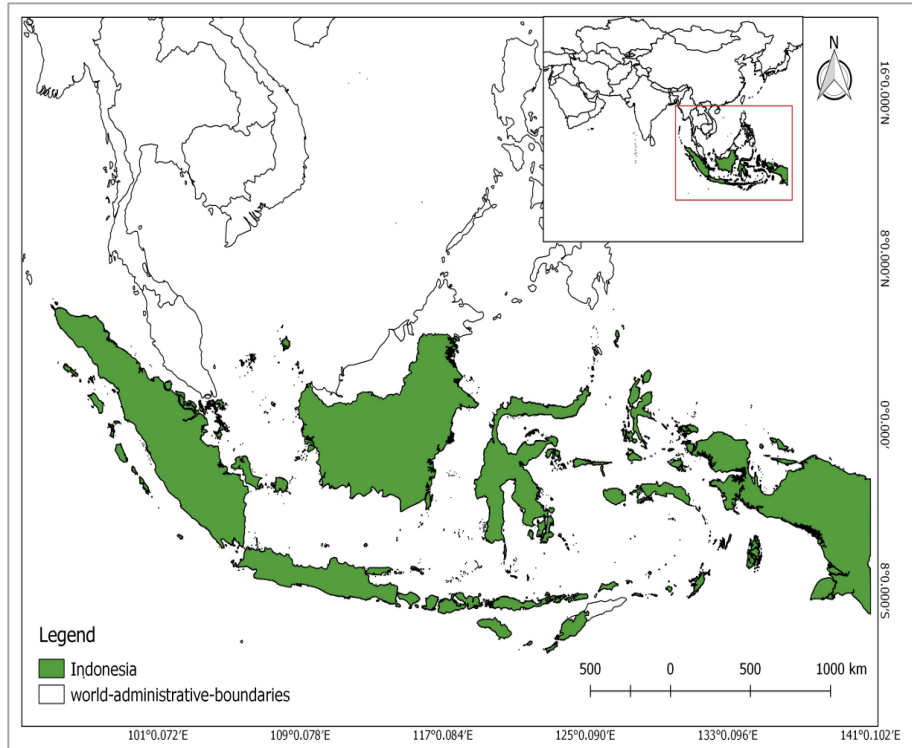


Figure 2.1: A map of the study country, Indonesia, created in Mapline to illustrate the geographic criteria in this study. The OWT actors investigated here are all in Indonesia- a country that heavily participates in the wildlife trade.

2.3. Focal species

The focal species for this study are all species from the following mammalian Orders: Carnivora (291 species), Dermoptera (2 species), Diprotodontia (147 species), Pholidota (8 species), and Primates (520 species)- totaling 968 potential focal species (IUCN, 2024). There are species-level factors that put mammalian species at a higher risk of extinction and overall, the individual availability doesn't match the consumer demand because of species declining population size (International Trade Center, 2015; IUCN, 2024). Figure 2.2. explains the factors that cause the higher threat of extinction on mammalian species in the trade. Of the focal orders, 150 species are local to Indonesia and 818 species are international species from: Africa (323 species), Asia (266 species), and South America (233 species) (IUCN, 2024).

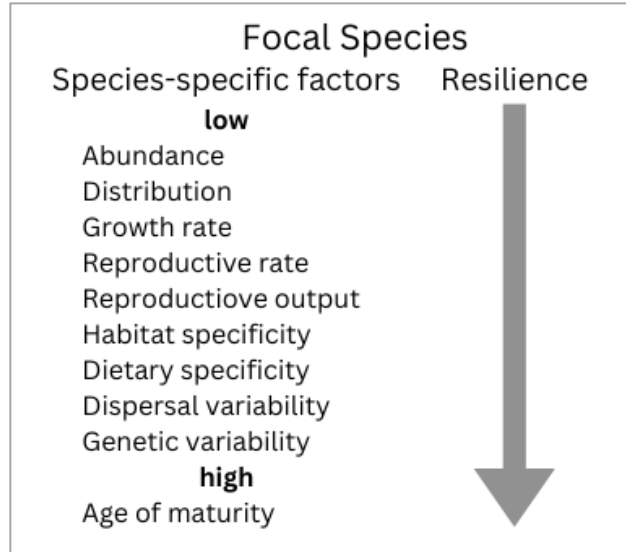


Figure 2.2: The factors that affect species ability to survive involvement in the wildlife trade and indicators that Mammalian species are more vulnerable to involvement.

The IUCN Red List database was used to determine each focal species threat status and the ways they were traded or consumed in the wildlife trade for Indonesian species. This can be seen in Table 2.1 and Table 2.2 (IUCN, 2024).

Table 2.1: The status of the native Indonesian focal species (i.e., mammalian) determined from the IUCN Red List database that suggests approximately 65% of the listed species are threatened (IUCN, 2024).

status	# species	Carnivora	Dermoptera	Diprotodontia	Pholidota	Primates
CR	18	.	.	5	1	12
EN	33	6	.	3	.	24
VU	46	9	.	11	.	26
NT	11	6	.	4	.	1
LC	40	13	1	26	.	.
DD	2	.	.	.	.	1

Table 2.2: The consumption method for the Indonesian focal species (i.e., mammalian) involved in the wildlife trade taken from the IUCN Red List database (IUCN, 2024). The main consumption categories for these species are wildlife traded for food, medicine, or as pets (IUCN, 2024).

consumption	# species	Carnivora	Dermoptera	Diprotodontia	Pholidota	Primates
Food	99	21	1	44	1	32
Medicine	18	9	.	1	1	7
Pets	44	7	.	4	.	33
Other	44	31	.	9	1	5

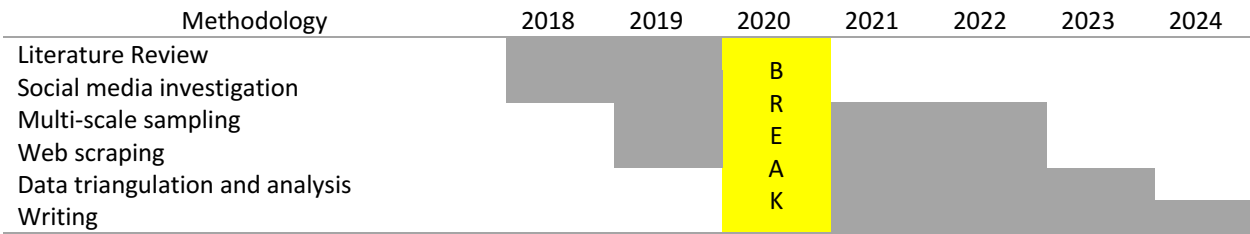
2.4. Ethics

All data collected throughout this study is publicly available to anyone with Internet access. There was no contact with the subjects of this study and subjects' personal information is not included. If there was a need to reference profiles or actors specifically, profile and actor names were coded, and subjects' privacy and data were protected (Di Minin et al., 2021).

2.5. Research

Research was conducted online in the United Kingdom from 2018-2020 and online in the United States of America from 2021-2022. Table 2.3 lists the timeline of activities below. Research was only conducted on profiles published to Instagram and Facebook that displayed the OWT in Indonesia from 2015-2022. All research was conducted by Grace Foreman. Once the literature review was complete, design flexibility, a type of observational research that leaves room for new research questions and/or topics to be developed throughout data collection and analysis, was chosen to design the research project (Booth et al., 2020). With similarity, Grounded Theory was applied throughout the research process. This theory involves developing hypotheses and theories that dictate the future course of the research through data collection and analysis (Dey, 2004; Oktay, 2012; Thornberg et al., 2014).

Table 2.3: The timeline of activities for the thesis being presented. Although breaks were taken, the research lasted about six years.



2.5.1. Social media investigation and monitoring

Multi-scale sampling was used to identify profiles on Instagram and Facebook that fit the following inclusion criteria: 1) established actor in the OWT; 2) geographically located in Indonesia; and 3) displays the trade of focal species (Crosby & Portal, 2018; Pimenta et al., 2018). The first sampling was conducted by searching terminology (Table 2.4) on Facebook and Instagram, referencing in the OWT in Indonesia, to identify profiles that used the terminology on their social media profile to trade wildlife (Feddema et al., 2020; Gore et al., 2021; Verissimo & Glikman, 2020; Verissimo & Wan, 2019). Hashtags were most useful as they are used by actors to outreach and engage with OWT communities, and it also leaves a blueprint for researchers to investigate. Search terminology was created based on knowledge of the OWT in Indonesia. Profiles that did not fit the inclusion criteria detailed above were removed, and profiles that did fit the criteria were selected for the study. A second sampling was conducted using the profiles found in the first sampling, and additional profiles were selected for the study based on their specific terminology and other engagements on their posts (Crosby & Portal, 2018; Pimenta et al., 2018). Finally, a third sampling was conducted by looking at the friends (Facebook) or followers (Instagram) of the selected profiles from sampling one and two (Feddema et al., 2020; Gore et al., 2021; Verissimo & Gilkman, 2020; Verissimo & Wan, 2019).

1343 Table 2.4: Terminology used in searches during the three samplings of the social media
 1344 investigations from 2019 to 2023 (Sinovas et al., 2017; Verissimo & Glikman, 2020; Verissimo &
 1345 Wan, 2019; Wyatt, 2021). New terminology was added to the investigations when identified in
 1346 data collection.

subject	terminology
actors	seller, jual, penjual, sell, hunter, supplier, bos, boss, bossku, buyer, pembeli, reseller, collector, hobby, hobby, kolektor
flow of communication	age, bulan, month, umur, usia, DM, friendly, healthy, sehat, lokasi, lok, price, cheap, harga, murah, rare, exotic, sex, betina, female, jantan, male, stock, stok, tame, jinak, jito, WhatsApp (WA)
flow of money	COD, PCB, rekber
flow of product	bus, bis, export, import, motor, sepeda, taxi, plane, pesawat, send, kirim, transport
geography terms	Indonesia, Java, Jawa, Jakarta, Borneo
legality	certificate, document, law, legal, safe, smart, trust
sourcing	breed, bred, catch, menangkap, forest, hutan, hunt, berburu, trap, jerat, wild, liar
trade terms	beli, jual, murah, pasar, shop, toko
wildlife terms	animal, bayi semak, beruang, binatang, binturong, caracal, harimau, hewan, haiwan, exotic, liar, kanguru, kapusin, kera, kubung, kucing, kucing marmer, kukang, kukus, kuskus, linsang, luak, luwak, macan, macan tutul, margay, monpai, monyet, monyet kecil, musang, musang akar, musang bulan, musang pandan, musang rase, ocelot, orangutan, otter, owa, peliharaan, pet, puma, siamang, simpanse, singa, surili, tarsius, trenggiling, unki

1347
 1348 Once samplings were complete, profiles run by the same actors were identified and grouped
 1349 based on the following factors: 1) same profile or personal name; and 2) indication by the
 1350 profile in posts or biographies of a linkage (Costa et al., 2023). From this, a focal group of actors
 1351 was created for the study, and data collection began (Costa et al., 2023; Phelps et al., 2016).

1352

1353 2.5.2. Web scraping

1354 Web Scraping was conducted for each profile in the focal group and involved the extraction of
 1355 data from Instagram and Facebook (Harrison et al., 2016; Masters et al., 2022; Stringham et al.,

2021; Xu et al., 2020). All data scraped in this study is public information available to any individual on the internet and the information is protected by researchers (Belanger & Crossler, 2011; Zimmer, 2020). Profile data was scraped from all Instagram and Facebook profiles using Phantom Browser and included profile metrics differing slightly based on the platform (Instagram vs. Facebook). Instagram profile data included profile URL, profile name, biography, number of followers, number of profiles following the selected profile, and number of posts (Bechmann & Vahlstrup, 2015; Singh et al., 2019; Yang, 2021). Facebook profile data included profile name, profile URL, biography, and location (Bechmann & Vahlstrup, 2015; Casteleyn et al., 2009; Singh et al., 2019). Profile metrics regarding the number of posts and the number of friends for Facebook profiles were collected manually (Devineni et al., 2017; Leung et al., 2018; Peters et al., 2013). Post data were then collected for each profile in the focal group. Post data includes engagement rates (number of comments and number of likes), media data (photographs and videos), and text data (captions and comments) and were scraped using Phantom Browser, 4K Stogram, and Bulk Image Downloader (Dolan et al., 2017; Feddema et al., 2020; Feddema et al., 2021; Stringham et al., 2021 (1)). Below, you can see Figure 2.3 and Figure 2.4 illustrating the types of data collected from profiles and posts. Data could not be collected for a small number of the selected profiles due to the following reasons: 1) no response error- profiles did not list the relevant data; 2) profile was deleted from the platform during monitoring; and 3) profile was switched to private settings during monitoring (Dooley & Lindner, 2003; Flick, 2018). Table 2.5 shows the data collection points sorted by chapter.

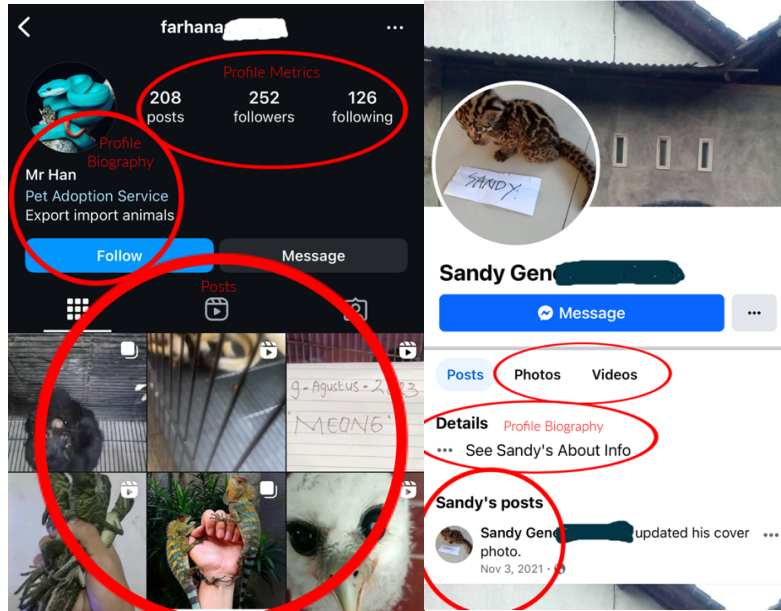


Figure 2.3: This figure displays screenshots of an Instagram profile (left) and a Facebook profile (right). The data points collected are circled in red.

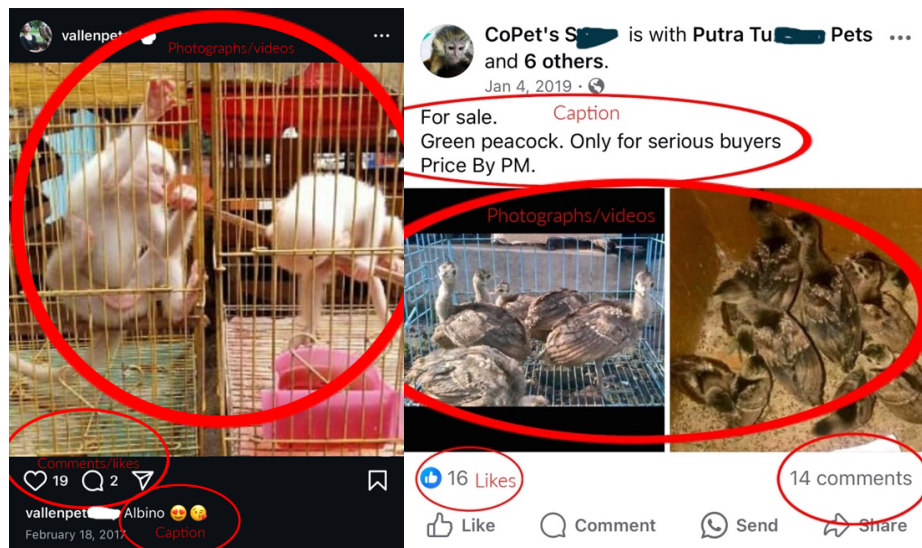


Figure 2.4: This figure displays screenshots of a post on Instagram (left) and a post on Facebook (right). The data points taken from these posts are circled in red.

Table 2.5: This table lists the data chapters (chapter 3-5) and the number of data points collected for that analysis.

data chapter	# data
Chapter 3	264 sellers 386 profiles (191 IN, 195 FB) 28,203 posts 104 species 16,392 individuals
Chapter 4	386 profiles (191 IN, 195 FB) 206 profile biographies 28,203 posts 10,506 hashtags
Chapter 5	20 profiles 3,401 photographs/videos 83 species 4,210 individuals

2.5.3. Data triangulation and analysis

In general, data triangulation involves multiple data sets, methods, and theories to answer the research questions in a study (Carter et al., 2014; Flick, 2018). Data triangulation was completed to analyze each dynamic of the OWT and the data triangulation strategy for chapters 3-5 which can be seen in Table 2.6 (Carter et al., 2014; Flick, 2018). Even though some of the same data is assessed between the chapters, data triangulation allowed this use to be done in different formats. For chapter 3, profile data gathered during web scraping was used to analyze the profile metrics in simple statistics and the trade chain with conversation in biographies, posts, and comments (Costa, 2021; Duffy et al., 2016; Phelps et al., 2016; 't Sas-Rolfes et al., 2019). Media data was sorted based on its relevance to the trade chain or the focal species, and text data was assessed to gather information on the trade chain or discover the geographical location of the user (Costa, 2021; Phelps et al., 2016). Post data was also triangulated to investigate the tagged geographic locations on posts if not mentioned in the text data. In chapter 4, the profile data was used differently to assess the names of profiles and their descriptions in text data using Social Networking Services (SNSs) (Kim & Seo, 2020; Walker et al., 2019). Both media and text data were triangulated to investigate three marketing techniques- branding, content marketing, and product marketing (Curtin & Papworth, 2018; Evans, 2010; Kachen & Krishen, 2020). In addition to this, social network analysis was

conducted on co-branding efforts seen through brands posting to promote additional brands (Goi & Goi, 2011; Paydas Turan, 2021). The media data used in chapter 5 was triangulated by choosing 20 select profiles significant to the study based on profile metrics to investigate and assess welfare.

Table 2.6: Data triangulation strategies for each chapter based on the data collected using web scraping. Triangulated data was split into data types such as profile data, media data, and text data.

	variable	data triangulation
Chapter 3	Profile metrics	profile data
	Trade chain	profile data, media data, text data
	Species	media data, IUCN database, CITES appendices
	SNA and supply groups	media data
	Geography	post data, text data
Chapter 4	Profile metrics	profile data
	Social Networking Services (SNSs)	text data
	Branding	profile data, media data, text data
	SNA	text data
	Content Marketing	media data, text data
Chapter 5	Product Marketing	media data, text data
	Welfare	media data

2.5.3.8. Profile metrics

Profile metrics helped to create and define actors using raw data to compare the focal group. Profile metrics include profile reach (# of followers or # of friends), profile size (# of posts), and trade size (# individuals traded) (Lipsman et al., 2012; Stringham et al., 2021; Weiss, 1972). Profile status was also monitored throughout the study and profiles were evidentially compared by status: 1) active, 2) deleted, and 3) switched to private (Bechmann & Vahlstrup, 2015; Harrington et al., 2023). Monitoring profile status was done to assess the effectiveness of social media platforms in achieving their goals of stopping the OWT.

2.5.3.9. Trade chain

Text data was analyzed to determine the dynamics of the trade chain, and media data was used to visually display these dynamics by creating figures in Canva (Gore et al., 2021). By analyzing the text in biographies, captions, and comments, relevant information was pulled out to determine the dynamics of the trade chain (Bears, 2019; Keskin et al., 2023). Dynamics include the actor's placement in the trade chain, the trade deal which includes the flow of information, the flow of money, and the flow of product, and the consumption methods (Gomez et al., 2019 (1); Harrington et al., 2021; Nijman, 2022; Phelps et al., 2016). Photographs added to the information and were pulled out to depict what we found about the OWT trade chain and then, in Canva, the figures were created.

2.5.3.10. Species Identification

The resources for species identification were collected (Table 2.7) and studied before the identification process of analyzing the media data (Gore et al., 2021; Wiersema, 2017). Species were identified to the furthest possible degree (i.e., species classification). For a few species, the furthest possible degree was a genus classification due to the young age of the individual being identified and/or physical similarity between species in the same genus (IUCN, 2024). Expert opinions were sought when difficulty during species identification occurred, and species that could not be identified were not included in the data set. Once species identification was completed, the number of individuals for each species was determined (Gaston & O'Neill, 2004; Waldchen & Mader, 2018). Duplicate posts of the same individuals were removed during identification to ensure proper reporting. Additionally, legality was determined for each species based on Indonesia's list of protected species and when analyzing the international trade, the CITES Appendices (IUCN, 2024; CITES, 2024).

1454 Table 2.7: The resources used for species identification training that are referenced throughout
 1455 the study and depended on for accurate species identification.

type	source	publication body
Database	IUCN Red List	IUCN Red List
Guides	A Manuel on Wildlife Species in trade	Wildlife Crime Control Bureau
	Field Guide to Mammals of Southeast Asia	.
	Identification Sheets for Wildlife Species Traded in Southeast Asia	TRAFFIC
	Mammals of South-East Asia	.
	Marmosets and Tamarins: Pocket Identification Guide	Conservation International
	Primate Field Guide	Oxford Brookes University
	South Asian Primates: Pocket Identification Guide	Conservation International
Books	Grzimek's Animal Life Encyclopedia	.
	Tropical Wildlife of Indonesia and Southeast Asia	Periplus Nature Guides
Apps	Animals Encyclopedia Guide	Edutainment Ventures

1456

1457 2.5.3.11. Geography

1458 Geographic location was determined through the analysis of the scraped profile data and/or
 1459 post data where actors either stated or tagged a location (Nijman et al., 2019 (1); Nijman et al.,
 1460 2021; Stringham et al., 2021 (2)). Location could not be determined for actors that did not list it
 1461 on their profile. It should be noted that all actors in the focal group were determined to be in
 1462 Indonesia from their language and comments, and if unable to conclude the location after this,
 1463 actors were removed from the study (Maulany et al., 2021; Stringham et al., 2021 (2)). Species
 1464 determined to be local or native to Indonesia by comparison to the IUCN Red List database to
 1465 species identified were labeled local trade (IUCN, 2024). Additionally, if determined to be the
 1466 international trade, species home range data (IUCN, 2024) was collected to assess potential
 1467 international links and heat maps of the global world were created using MapCreator (Hill et al.,
 1468 2009; Laver & Kelly, 2008). These maps identified hot spots based on where international
 1469 species potentially come from or natively live, and the IUCN Red List database was used to
 1470 identify the home range data of the species found (IUCN, 2024). Each country received a score
 1471 if their native species were traded, falling into categories labeled by the scores, and mapped
 1472 using colors to represent it.

2.5.3.12. Social network analysis

Social Network Analysis (SNA) was conducted to identify linkages between the actors in this study, and SNA was also used to approve or disprove whether supply groups were present (Costa, 2021; Moshier et al., 2019; Salas-Picaso et al., 2023). This analysis differed from the trade chain analysis which focused on the dynamics and placement within the system while SNA investigates relationships between actors (Costa, 2021; International Trade Center, 2015; Moshier et al., 2019). Parameters include the limitation of the 286 chosen actors and the use of only the photographs or videos posted by multiple actors with the same media. Supply groups were identified based on media data that showed multiple actors posting the same individual(s) for sale (Costa et al., 2023; McNamara et al., 2016). Actors are represented by nodes and, relationships between actors are called edges (Collard, 2013). Nodes represent an individual actor or supply group, and the edges represent the number of times a relational link occurred (Collard, 2013). Key Nodes, representing influential actors in the SNA based on a larger edge, were determined (Costa, 2021; Patel et al., 2015). The other nodes were labeled either Binary Nodes (two relational linkages) or Singular Nodes (single relational linkage) (Costa, 2021; Costa et al., 2021; Patel et al., 2015). The degree of centrality (the number of edges) and the specialty for each supply group was also determined (Krnec & Shrekovski, 2020; Zhang & Luo, 2017). Social Network Visualizer was used to create a figure that visually represents the SNA found between the supply groups.

2.5.3.13. Social media and marketing

Social media and the marketing strategies used by actors when participating in the OWT were investigated to determine the methods and effectiveness on an actor's trade success (Feddemba et al., 2020; Sung & Fong, 2018; Xu et al., 2020). First, the Social Networking Services (SNSs) were investigated to determine the number of posts per profile, the engagement rates (likes/comments), and the hashtags used (Kim & Seo, 2020; Walker et al., 2019). Branding was then assessed by triangulating the profile names into three categories: 1) business name; 2) personal name; and 3) random name (Boush, 2013; Phumsathan et al., 2023). Examples of a business name might be something like 'Sandy Pets' while a personal name is something like

‘Sandy Smith’. All other names were considered random. Once each profile was put into one of these categories, the data and metrics were compared across them. Media data was also analyzed to document the use of brand logos and/or signs (Goi & Goi, 2011; Phumsathan et al., 2023). Rebranded profiles (profiles that changed brand names during data collection) were also assessed to determine the rebrands effect on profiles metrics (Goi & Goi, 2011). Content marketing is a strategy that focuses on the actual content such as posts and biographies to market wildlife product (Feddema et al., 2020; Kotler, 1965). This information was assessed by pulling text out of the content and investigating its message. Finally, product marketing, a type of marketing that focuses on the product, was assessed by analyzing the text data that mentions the product and photographs or videos of the content (Feddema et al., 2020; Kotler, 1965; Rowley, 2008; Sung & Fong, 2018).

2.5.3.14. Animal welfare

Animal welfare was assessed through an investigation of the media data to draw a comparison between the Five Freedoms of animal welfare and the OWT conditions (Mellor, 2016; Miller & Chinnadurai, 2023; Webster, 1993; Webster, 2001). First, 20 profiles were selected based on their significance in the OWT, and 3,401 photographs and video published by these profiles were selected to assess welfare. Indicators of negative welfare conditions for each of the Five Freedoms can be seen in Table 2.8 (Hosey et al., 2013). If photographs or videos displayed indications of these indicators, a score was given to the freedom or freedom(s) the indicator was categorized in (Kitson & Nekaris, 2020). The same methodology was used to analyze each photograph or video, but it should be noted that welfare violations may differ between species (Tobin et al., 2022; Webster, 1993). Limitations were considered. It is possible that the investigated media was from the internet or individuals were removed from their enclosures for the photograph or video. Therefore, as an example, enclosures were only investigated if clearly seen but violations were not identified based on the lack of an enclosure. As to the possibility of the photograph being pulled from the internet, data collection stayed consistent throughout, and it is assumed that the media was their own. However, the idea that it wasn’t was still considered. Duplicate media were removed before analysis.

Table 2.8: The 5 Freedoms used to assess individual welfare in the OWT and the indicators for each based on published studies. Data analysis may be different based on the species that are assessed.

Freedom	Welfare Indicators
Freedom from hunger and thirst	access to food, access to water
Freedom from discomfort	enclosure type, stocking density (number of individuals in the enclosure)
Freedom from pain, injury, or disease	body condition score (skin lesions, hair loss, visible injuries), weight (normal vs. obesity)
Freedom to express normal behavior	stocking density, human-wildlife interactions, inter-species interactions
Freedom from fear and distress	facial expressions, vocalizations, presence of a hiding place

Chapter 3: The trade chain in the OWT

3.1. Introduction

This chapter focuses on the who, what, how, and where regarding the OWT in mammalian species on Instagram and Facebook in Indonesia. The trade chain includes the flows and processes that actors participate in when engaging in OWT business and understanding the dynamics of this trade chain is key to understanding the OWT. Actors, the individuals, or groups that make up a network or trade chain, are an important aspect of the OWT, and the actors analyzed in this study can be seen in Table 3.1. Without knowing who the actors are and how they interact in the OWT, interventions and assessments will be at a disadvantage (Sanchez-Mercado et al., 2020). Key sellers, or key nodes, are important because they have the knowledge, resources, and skills needed to act and manage flows, processes, and relationships with other actors (Costa et al., 2021). Sellers depend on other actors to participate in the trade chain in a way that carries little to no risks (Bridgeland-Stephens, 2020), and new actors have easy access and are joining the OWT in large volumes, forming a less structured trade chain in comparison to the trade that occurs in physical settings (Lavorgna, 2015).

Table 3.1: The OWT actors discussed in this chapter from the seller's point of view (Harrison et al., 2016; Lavorgna & Sajeva, 2021; Moorhouse et al., 2020).

Actor	Details
Seller	purchases wildlife from hunters or suppliers, and sells directly to buyers; can suggest species to hunters/suppliers, but also purchases whatever species is available; use social media to conduct trade with buyers; range in experience level based on the number of years involved, their number of network connections, and the number of individuals in their supply; sometimes have dual roles as hunters, suppliers, or transporters; some have jobs in other fields, and some depend on the trade as a main source of income
Hunter	sells wildlife directly to sellers and suppliers; driven by the demand created by sellers and buyers; not normally seen on social media; can work alone or in a group of other hunters; can be opportunistic or specialized; can play a dual role as a seller; rarely use the individuals they hunt themselves
Supplier	supplies wildlife to sellers; has strong connections to several sellers, hunters, and even buyers; driven by the demand created by sellers and buyers; sometimes seen on social media; more likely to specialize in the trade of certain species; can play a dual role as a hunter or seller
Buyer	purchases wildlife from sellers, hunters, and suppliers; uses social media to purchase wildlife from sellers; can be an occasional or frequent buyer; drives the demand of wildlife species; motivated by the desire for wildlife species use and trade
Collector	a type of buyer that purchases specific wildlife species from sellers, hunters, and suppliers for their personal collection; normally seek species perceived as rare/exotic; uses social media to contact sellers and inquire about species desired for collection
Reseller	a type of buyer that purchases wildlife from sellers only to resell the individual themselves at a higher price; uses social media to conduct the purchase and sale of these individuals
Rekber	a third-party actor that manages the flow of money between sellers and buyers; uses social media to conduct this trade flow
Transporter	transports wildlife between actors; sometimes unaware of their participation in the online wildlife trade chain; financially motivated if aware of involvement; not normally seen on social media

1576

1577 Sellers are the focal actors investigated in this thesis because they're the creators of social
1578 media profiles dedicated to the OWT, but understanding other actors is still important
1579 (Woolloff et al., 2022; Wright, 2019). Buyers drive the demand of wildlife products through
1580 their preferences and desired use and trade, normally increasing the demand for threatened

species and bringing them to the consumer market (Wright, 2019). Suppliers that do participate in the online aspect of the OWT increase their network, facilitating relationships with actors in other countries, and expanding the scale of their involvement (Woolloff et al., 2022). Supply groups (SG) can be a network of sellers that coordinate individuals traded amongst them or a single supplier that works with multiple sellers (Woolloff et al., 2022). Collectors are buyers that only buy specific, rare wildlife products for their personal use/collection (Harrington et al., 2021; Sy, 2017), and specifically seek out sellers that meet their demand, a trade activity that reportedly produces significant financial benefits for sellers (Harrington et al., 2021; Lavorgna & Sajeve, 2021; Sy, 2017; Wyatt et al., 2020). Resellers are buyers that buy wildlife only to then sell the wildlife products themselves at a higher price (Demeau et al., 2019; Lavorgna & Sajeve, 2021; Siriwat & Nijman, 2018). Rekber is an actor that participates online, and this third-party actor may never interact with wildlife themselves but rather facilitates a way for the OWT to be conducted more easily (Bears, 2019; Nijman, 2022; Nurbandi, 2022). The remaining actors, hunters and transporters are very unlikely to be online (Latinne et al., 2020; Maulany et al., 2021; Nijman et al., 2015 (2)).

3.1.1. Aims, objectives, and research questions

The aims, objectives, and research questions can be seen below in Table 3.2. It is predicted that by conducting this investigation into the OWT on Facebook and Instagram in Indonesia, I will be able to gather information on the trade chain and the actors that form it. The investigation will determine that there a trade chain specific to the OWT that allows for a mass trade of wildlife species. The focal species will be traded on these platforms in large numbers specific to the species threat level. It is also predicted that the OWT will allow for a larger network of actors that either collaborate, use, or participate in supply groups and the online aspect will allow these groups to extend across the globe.

Table 3.2. The aims and objectives for Chapter 3 that focus on evaluating the dynamics of the OWT in Indonesia on Instagram and Facebook.

category	details
Aims	Identify the actors involved in the OWT on Instagram and Facebook in Indonesia to investigate and monitor profiles run by identified actors and gather information on the dynamics of the OWT
Objectives	1) Complete a social media investigation to identify profiles involved in the OWT on Facebook and Instagram in Indonesia 2) Monitor the profiles identified and conduct an observational study of the profiles to collect data on the dynamics of the OWT 3) Collect data from each profile through web scraping 4) Utilize data triangulation to analyze the data for the following dynamics: trade chain, species, social network and supply groups, and geography
Research Questions	1) Who are the actors involved in the OWT on Instagram and Facebook in Indonesia? What role do they play? What is their place in the flows and processes? 2) Which focal species are traded by these actors? How many individuals are traded for each species? How much of this trade is illegal in Indonesia? How much of the international trade is CITES regulated? 3) Are there supply groups present in the OWT on Instagram and Facebook in Indonesia? How are sellers connected through these supply groups? What species are involved in the trade in these supply groups? Where are the actors in each supply group located? 4) What is the geographic location of sellers involved in the OWT on Instagram and Facebook in Indonesia? What geographic areas are sellers potentially linked to based on the international species they sell?

1610

1611 3.2. Methodology

1612 3.2.1. Data Collection

1613 A social media investigation was conducted to identify profiles on Instagram and Facebook
1614 involved in the OWT in Indonesia. Key terminology related to the OWT was searched on both
1615 platforms in Indonesian and English, and these terms can be found in Chapter 2. Continued
1616 monitoring of the profiles was conducted between 2018-2019 and then 2021-2022. This
1617 included initial observation of the profiles as well as notes that were taken on the information
1618 relevant to this study that directed the rest of the research. Profile status was monitored, and it
1619 was noted when profiles were deleted or switched from public to private settings. Web
1620 scraping was then conducted for each profile as explained in Chapter 2. Data was then

triangulated for analysis in this chapter to assess profile metrics, the trade chain, species factors, supply groups (SG's), and a geographical context (Carter et al., 2014; Flick, 2018).

3.2.2. Data analysis

First, profile metrics were analyzed and, the frequency of profiles was determined for each platform. Profile reach was determined based on the number of followers (Instagram) or the number of friends (Facebook) (Lipsman et al., 2012; Stringham et al., 2021 (1); Weiss, 1972). Profile size was determined based on the number of posts for each profile. Trade size was determined based on the number of individuals traded by the profile. Correlation tests were run in SPSS statistics to determine a correlation between profile reach, profile status, and trade size.

Key terminology identified during the observational study was used to conduct an NVivo analysis aimed at determining actor roles and details on the flows/processes. This terminology can be seen in Chapter 2. Media data was also analyzed, and media that visually showed flows/processes was flagged.

Media data was also used to determine the species traded and number of individuals traded for each species. Some text data did include details on the trade of more species/individuals, but it was not paired with media and occurred in low frequencies. Therefore, this data was not used to assess species. The IUCN Red List database and the CITES database was used to determine species type (IUCN, 2024). Species were assigned to either non-threatened species or threatened species (IUCN, 2024; Nijman, 2022). Species are considered common if labeled as Least Concern (LC) or Near Threatened (NT), and threatened species include species labeled Vulnerable (VU), Endangered (EN), or Critically Endangered (CR) (IUCN, 2023). Trade type was determined based on the home range of each species detailed in the IUCN Red List database and assigned either local trade or international trade based on its natural presence in Indonesia (IUCN, 2024).

Analysis of media identified instances of the same media being posted by multiple sellers indicating supply groups (SG's). These instances were flagged, and the details of these posts (date published, species, caption) as well as the sellers involved in each instance were analyzed. Linkages and relational data were determined for each instance (Patel et al., 2015). Social Network Analysis (SNA) was then conducted based on this data (Patel et al., 2015; Sanchez-Mercado et al., 2020). Nodes in this social network were identified, and the edges between these nodes were determined (Patel et al., 2015; Sanchez-Mercado et al., 2020). Node weight was calculated based on the number of instances each node was involved (Huang et al., 2020; Patel et al., 2015). Scaling for node weight was created based on the range, mean, median, and mode of the data set, and the following ranks were determined: node weight 1 (linkage to one instance); node weight 2 (linkage to two instances); and node weight 3 (linkage to three or more instances) (Sanchez-Mercado et al., 2020). Nodes were labelled based on this rank order scale. Sellers with a node weight of 3 are labelled Key Nodes (K#), sellers with a node weight of 2 are labelled Binary Nodes (B#), and sellers with a node weight of 1 are labelled Singular Nodes (S#) (Costa, 2021; Costa et al., 2021; Patel et al., 2015). A visual representation of this social network was created using the ClickCharts Diagram Software, and this representation revealed supply groups (SG's) within the network. These groups are inferred nodes and labelled Supply Groups (SG#) (Costa et al., 2021; Patel et al., 2015). In the network structure, the size of the node is based on node weight, and therefore the larger the node, the larger the node weight (Wenyang et al., 2020). Additionally, edges are represented by the lines connecting two nodes, and the larger the width of an edge, the stronger a linkage is between two nodes (Pires et al., 2023; Sanchez-Mercado et al., 2020; Wenyang et al., 2020).

Geographic location was determined for each seller through analysis of the profile data and post data. Locations were listed in the: 1) text data from profile biographies; 2) tagged locations in post data; 3) text data from captions; and 4) text data from comments. If not listed within this data, location could not be determined for that seller. It should be noted that even in this circumstance, it is definite that all sellers in this study are in Indonesia. A heat map based on this was created using MapCreator. The locations that trade frequently occurred among the

supply groups (SG's) was included in this map. A heat map was also created in the same program to show the potential source countries of international species traded based on the home range data collected from the IUCN Red List Database (IUCN, 2024).

3.3. Results

3.3.1. Profile metrics

Social media investigation and monitoring identified 264 sellers and 386 profiles (191 Instagram profiles and 195 Facebook profiles). Data analysis showed 68.2% of sellers only run 1 social media profile, and 31.8% of sellers run multiple social media profiles (n=264). There were also 60 profiles deleted throughout the course of the study accounting for 15% of all profiles (n=386). Additionally, 14 (n=386) Instagram profiles switched to private settings throughout the study. Deleted profiles and profiles that switched to private settings were no longer monitored after the date the status change occurred.

Profile metrics can be seen in Table 3.3. The average profile reach is 2506. The average trade size is 47 individuals. It should be noted that trade size is in the context of focal species, and sellers may additionally trade species outside of the focal species which would inevitably raise their trade size. A Spearman's rho correlation test revealed a positive correlation between profile reach and profile status (.280**) as well as profile reach and trade size (.189**).

Table 3.3: The profile metrics for actors in the focal group compared to the activity level throughout the study to assess the reasoning for their removal.

	rank	rank details	# profiles	# active profiles	# deleted profiles
profile reach	1	1-199	88	85	3
	2	200-599	86	78	8
	3	600-1,999	82	76	6
	4	2,000-9,999	124	80	50
	5	10,000+	6	6	0
trade size	1	0-9	176	143	33
	2	10-39	112	101	11
	3	40-149	67	59	8
	4	150-499	26	18	8
	5	500+	5	4	1

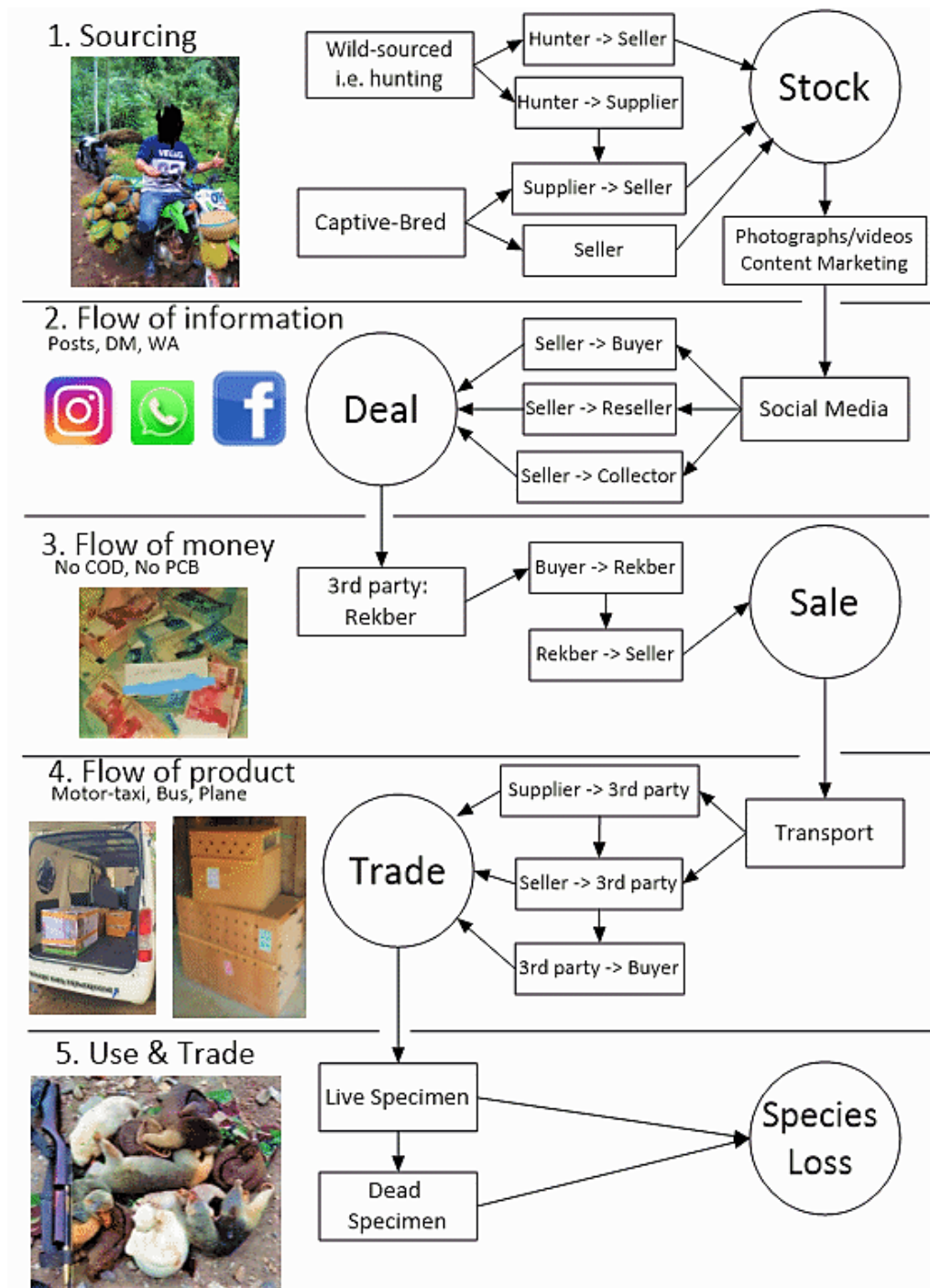
1707

1708 3.3.2. Trade chain

1709 Web scraping resulted in the collection of data from roughly 70,500 posts published by sellers
1710 and approximately 40% (n= 70,508) of these posts were relevant to the study. Of these relevant
1711 posts, 43.3% (n=28,203) referenced a seller. About 12.8% of posts referenced a hunter, and
1712 23.7% of posts referenced a supplier- referring to them as my boss (n=28,203). Additionally,
1713 13.4% referred to buyers. More specifically, 5.3% of posts advertised to collectors and 1.6% of
1714 posts advertised to resellers (n=28,203). Finally, 20.6% referred to Rekber and no posts
1715 specifically reference a transporter, and 43.3% of posts state they are ready to send individuals
1716 directly (n=28,203). Legality, safety, and trust was discussed frequently in biographies, post
1717 captions, and comments, highlighting actors knowledge of legal consequences and stressing
1718 security in OWT activities. About 23.7% (n=28,203) of posts referenced safety and trust directly.
1719 Another 14.7% (n=28,203) of posts referred to the law and/or legal status of the trade. An
1720 additional 4.3% (n=28,203) of posts referenced documents or certificates. Media data revealed
1721 that these posts were sometimes paired with documents or certificates certified by the
1722 government of Indonesia, although examples are not included to ensure the privacy of sellers.

1723 An overview of the actors and flows/processes identified in the OWT on Instagram and
 1724 Facebook in Indonesia can be seen in Figure 3.1.

1725
 1726
 1727



1728

1729 Figure 3.1: The trade chain identified in the 28,203 relevant posts published to Instagram and
1730 Facebook reveal seven actors involved in five different flows/processes (International Trade
1731 Center, 2015; Manzi, 2020).

1732

1733 Approximately 12.8% of posts indicated wild-sourcing and an additional 3.6% of posts
1734 specifically referenced hunting (n=28,203). As stated above, 23.7% (n=28,203) of posts referred
1735 to a supplier. Although details of this relationship were not directly stated, the reference to a
1736 supplier indicates the presence of sourcing from a supplier. Lastly, 13.5% (n=28,203) of posts
1737 indicated captive breeding regarding sourcing.

1738

1739 Flow of information played an important role in posts. Approximately 66.2% of posts listed
1740 additional contact information for the seller- 48.9% instructed buyers to contact them via
1741 WhatsApp, 55.1% instructed buyers to direct message (DM) them, and 6.2% listed other social
1742 media profiles that can be used to contact them (n=28,203). Location information was also
1743 listed in 47.4% (n=28,203) of posts. Additionally, most of the posts shared information on the
1744 individuals available for trade, and marketing did play a role. Details about the individuals
1745 included the individuals age (62.2%) and the individuals' sex (71.5%) (n=28,203). Additionally,
1746 terminology was used to market individuals, and this included referring to individuals as healthy
1747 (21.3%), tame (27.9%), and friendly (2.4%) (n=28,203). Rare was also used to define species in
1748 5.6% of posts, and exotic was used in 29.9% of posts (n=28,203). Albino individuals were clearly
1749 desired and therefore traded, and 16.6% of posts specifically stated the availability of albino
1750 species for trade (n=28,203). When referring to individuals available for trade, sellers referred
1751 to them as their stock in 17.9% of posts, and 2.0% of these posts stated their stock was good
1752 quality (n=28,203).

1753

1754 Most posts did not specifically list pricing, and 35.8% of posts detailed information relevant to
1755 the flow of money (n=28,203). As stated above, 20.6% of posts instructed buyers to use Rekber
1756 (n=28,203). There were 22.4% of posts that stated No COD, and 19.0% of posts that stated No
1757 PCB (n=28,203). Additional marketing techniques were used, and sellers stated that

transactions would be cheap in 34.0% of posts (n=28,203). Media data also revealed that sellers post photographs of bank transfers, and receipts, and group conversations between sellers/buyers/rekber referred to as a testimonial in 19.7% of posts to prove they are a trusted seller (n=28,203). Examples of this media would be included, however it was determined that the seller's identity would be compromised if media was presented. Additional media data does reveal that some cash transactions do occur, and examples can be seen below in Figure 3.2.



Figure 3.2: Three Instagram posts from three separate actors' Instagram profiles indicating the use of cash in the OWT despite many actors stating no cash on delivery (COD).

In general, 69.1% of posts referenced the flow of product, although most simply referenced their ability to send (43.3%) wildlife product (n=28,203). More specifically, approximately 5.1% of posts indicated that import was possible, and an additional 3.6% of posts indicated that export was possible (n=28,203). Modes of transport were also detailed and included motorbike or taxi (12.5%), bus (14.1%), or plane (5.7%) (n=28,203). Media data provided further information on the flow of product and revealed that motorbike/taxi is the main mode of transport. Also included were a small number of media displaying buses and cars as modes of transport. Examples of this media can be seen below in Figure 3.3.



Figure 3.3: Eight photographs (6 Facebook, 2 Instagram) from nine different actors profiles displayed how wildlife is transported from one actor to another.

3.3.3. Species

Analysis of the species traded revealed 104 different species and 16392 individuals pertaining to these species (Table 3.4). Almost all the trade was local (93.7%) (n=16392), and 34 species (40.5% of trade) (n=104) were illegally traded based on Indonesian law. Of the international trade, 52 species were identified, and 85% of this trade was in CITES-listed species. Local species were traded in larger numbers- averaging 284 individuals per species- and international species were traded in lower numbers- averaging 21 individuals per species. Non-threatened species were traded more frequently (61.2%) (n=16,392) and in larger numbers (218 individuals per species), while threatened species were traded in a lesser degree (22.4%) (n=16,392) and in smaller numbers (77 individuals per species). About 16.4% of the trade involved uncommon species (n=16,392). Birds, plants, reptiles, amphibians, and other mammals were also seen but not recorded.

1798 Table 3.4: The 104 species traded in this study compared to the metrics from the IUCN
 1799 database highlighting legality and the CITES listed species. Number of individuals refers to how
 1800 many individuals were traded for each species.

scientific name	common name	# individuals	IUCN Red List	legality Y/N	CITES I-III
<i>Ailurus fulgens</i>	Red Panda	8	EN	N	I
<i>Vulpes lagopus</i>	Arctic Fox	2	LC	N	.
<i>Otocyon megalotis</i>	Bat-eared Fox	34	LC	N	.
<i>Cuon alpinus</i>	Dhole	8	EN	Y	II
<i>Vulpes zerda</i>	Fennec Fox	149	LC	N	II
<i>Vulpes vulpes</i>	Red Fox	7	LC	N	III
<i>Catopuma temminckii</i>	Asiatic Golden Cat	105	NT	Y	I
<i>Felis nigripes</i>	Black-footed Cat	4	VU	N	I
<i>Lynx rufus</i>	Bobcat	3	LC	N	II
<i>Caracal caracal</i>	Caracal	102	LC	N	I
<i>Acinonyx jubatus</i>	Cheetah	17	VU	N	I
<i>Lynx lynx</i>	Eurasian Lynx	5	LC	N	II
<i>Prionailurus viverrinus</i>	Fishing Cat	4	VU	Y	II
<i>Prionailurus planiceps</i>	Flat-headed Cat	5	EN	Y	I
<i>Panthera pardus</i>	Leopard	126	VU	Y	I
<i>Prionailurus bengalensis</i>	Leopard Cat	1349	LC	Y	I
<i>Panthera leo</i>	Lion	82	VU	N	I
<i>Pardofelis marmorata</i>	Marbled Cat	67	NT	Y	I
<i>Leopardus wiedii</i>	Margay	3	NT	N	I
<i>Leopardus pardalis</i>	Ocelot	1	LC	N	I
<i>Puma concolor</i>	Puma	3	LC	N	I
<i>Prionailurus rubiginosus</i>	Rusty Spotted Cat	1	NT	N	I
<i>Leptailurus serval</i>	Serval	101	LC	N	II
<i>Neofelis diardi</i>	Sunda Clouded Leopard	129	VU	Y	I
<i>Panthera tigris</i>	Tiger	136	EN	Y	I
<i>Herpestes javanicus</i>	Javan Mongoose	195	LC	N	III
<i>Suricata suricatta</i>	Meerkat	35	LC	N	.
<i>Parahyaena brunnea</i>	Brown Hyaena	3	NT	N	.
<i>Crocota crucuta</i>	Spotted Hyaena	1	LC	N	.
<i>Hyaena hyaena</i>	Striped Hyaena	16	NT	N	III
<i>Mephitis mephitis</i>	Striped Skunk	1	LC	N	.
<i>Meles leucurus</i>	Asian Badger	3	LC	N	.
<i>Mustela lutreola</i>	European Mink	3	CR	N	.
<i>Arctonyx collaris</i>	Greater Hog Badger	6	VU	N	.
<i>Mustela lutrolina</i>	Indonesian Mountain Weasel	20	LC	N	.
<i>Melogale orientalis</i>	Javan Ferret Badger	396	LC	N	.

<i>Mustela nudipes</i>	Malay Weasel	6	LC	N	.
<i>Lutra lutra</i>	Otter	2525	NT	Y	I
<i>Mustela sibirica</i>	Siberian Weasel	3	LC	N	III
<i>Arctonyx hoevenii</i>	Sumatran Hog Badger	35	LC	Y	.
<i>Martes flagivula</i>	Yellow-throated Marten	39	LC	N	III
<i>Prionodon linsang</i>	Banded Linsang	55	LC	Y	II
<i>Prionodon pardicolor</i>	Spotted Linsang	19	LC	N	I
<i>Procyon lotor</i>	Northern Raccoon	51	LC	N	.
<i>Melursus ursinus</i>	Sloth Bear	2	VU	N	I
<i>Helarctos malayanus</i>	Sun Bear	95	VU	Y	I
<i>Hemigalus derbyanus</i>	Banded Civet	34	NT	N	II
<i>Arctictis binturong</i>	Binturong	548	VU	Y	III
<i>Genetta genetta</i>	Common Genet	21	LC	N	.
<i>Paradoxurus hermaphroditus</i>	Common Palm Civet	4431	LC	N	III
<i>Viverra zibetha</i>	Malay Civet	50	LC	N	.
<i>Paguma larvata</i>	Masked Palm Civet	806	LC	N	III
<i>Cynogale bennettii</i>	Otter Civet	5	EN	Y	II
<i>Verrucula indica</i>	Small Indian Civet	1105	LC	N	III
<i>Arctogalidia trivirgata</i>	Small-toothed Palm Civet	436	LC	N	.
<i>Macrogalidia musschenbroekii</i>	Sulawesi Civet	115	VU	Y	.
<i>Galeopterus variegatus</i>	Sunda Flying Lemur	13	LC	N	.
<i>Ailurops ursinus</i>	Bear Cuscus	20	VU	Y	.
<i>Spilogale rufoniger</i>	Black-spotted Cuscus	14	CR	Y	.
<i>Spilogale maculatus</i>	Common Spotted Cuscus	59	LC	Y	II
<i>Phascogale cinereus</i>	Koala	1	VU	N	.
<i>Phalanger orientalis</i>	Northern Common Cuscus	4	LC	N	II
<i>Strigocercus pelengensis</i>	Peleng Cuscus	7	LC	N	.
<i>Phalanger mimicus</i>	Southern Common Cuscus	3	LC	N	II
<i>Spilogale papuensis</i>	Waigeo Cuscus	1	VU	Y	II
<i>Notamacropus spp.</i>	Wallaby/Tree Kangaroo	167	.	N	.
<i>Manis javanica</i>	Sunda Pangolin	61	CR	Y	I
<i>Hylobates agilis</i>	Agile Gibbon	100	EN	Y	I
<i>Varecia variegata</i>	Black-and-white Ruffed Lemur	1	CR	N	I
<i>Eulemur fulvus</i>	Brown Lemur	2	VU	N	I
<i>Galago spp.</i>	Bushbaby	50	.	N	II
<i>Macaca nigra</i>	Celebes-Crested Macaque	15	CR	Y	II
<i>Pan troglodytes</i>	Chimpanzee	4	EN	N	I
<i>Cebus capucinus</i>	Colombian White-throated Capuchin	3	VU	N	II
<i>Macaca fascicularis</i>	Common Long-tailed Macaque	916	EN	N	II
<i>Callithrix jacchus</i>	Common Marmoset	181	LC	N	II
<i>Saguinus oedipus</i>	Cotton-headed Tamarin	26	CR	N	I
<i>Cercopithecus neglectus</i>	De Brazza's Monkey	3	LC	N	II

<i>Cebus aequatorialis</i>	Ecuadorian White-fronted Capuchin	1	CR	N	II
<i>Callithrix geoffroyi</i>	Geoffroy's Tufted-Ear Marmoset	1	LC	N	II
<i>Saguinus midas</i>	Golden-handed Tamarin	12	LC	N	II
<i>Leontopithecus chrysomelas</i>	Golden-headed Lion Tamarin	16	EN	N	II
<i>Leontocebus illigeri</i>	Illiger's Saddle-back Tamarin	1	NT	N	II
<i>Presbytis comata</i>	Javan Surili	473	VU	Y	II
<i>Hylobates lar</i>	Lar Gibbon	88	EN	Y	I
<i>Hylobates muelleri</i>	Mueller's Bornean Gibbon	14	EN	N	I
<i>Presbytis natunae</i>	Natuna Island Surili	4	VU	Y	II
<i>Pongo spp.</i>	Orangutan	66	CR	Y	I
<i>Trachypithecus phayrei</i>	Phayre's Leaf Monkey	3	EN	N	II
<i>Macaca spp.</i>	Pig-tailed Macaque	82	.	N	II
<i>Nasalis larvatus</i>	Proboscis Monkey	37	EN	Y	I
<i>Cebuella spp.</i>	Pygmy Marmoset	14	VU	N	II
<i>Varecia rubra</i>	Red Ruffed Lemur	1	CR	N	I
<i>Lemur catta</i>	Ring-tailed Lemur	2	EN	N	I
<i>Symphalangus syndactylus</i>	Siamang	122	EN	Y	I
<i>Macaca siberu</i>	Siberut Macaque	1	EN	N	II
<i>Hylobates moloch</i>	Silvery Gibbon	98	EN	Y	I
<i>Nycticebus spp.</i>	Slow Loris	87	.	Y	I
<i>Saimiri spp.</i>	Squirrel Monkey	5	.	N	II
<i>Tarsius spp.</i>	Tarsier	17	.	Y	II
<i>Perodicticus potto</i>	West African Potto	2	NT	N	II
<i>Presbytis siamensis</i>	White-thighed Surili	29	NT	Y	II
<i>Cynomys spp.</i>	Prairie Dog	17	.	N	.
<i>Hystrix javanica</i>	Sunda Porcupine	37	LC	Y	.

1801

1802 3.3.4. Supply groups (SG) and social network analysis (SNA)

1803 Media data revealed that 38.6% of sellers (n=264) in this study are linked to supply groups
1804 (SG's) that utilize social media by having multiple sellers in a supply group (SG) create a post
1805 advertising the trade of the same individual or individuals. Although only a portion of sellers in
1806 this study are involved in these supply groups (38.6%) (n=264), the sellers that are involved
1807 account for 63.4% of the trade seen in this study (10,397 individuals) (n=16,392). Additionally,
1808 69.5% of the trade was in threatened species and 82.7% of the international trade was
1809 conducted by these sellers (n=16,392). Investigation of these supply groups (SG's) identified
1810 111 instances of multiple sellers posting the same individual(s) for trade. Most instances
1811 involved two sellers (61.3%), and 38.7% of instances involved anywhere from 3 to 8 sellers
1812 (n=111). An example of these instances can be seen in Figure 3.4.

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Figure 3.4: Two bushbabies traded by three sellers in one supply group (2 Instagram, 1 Facebook). Photographs were published by three different profiles within the same two days, and each had a separate caption seen underneath the photographs.

Social network analysis (SNA) was conducted on the supply groups to learn more about their specific place within the supply group. There were 100 nodes (i.e., actors or groups) identified, and these nodes create 303 edges in the network that represent the linkages between the nodes. Sellers varied on the number of edges, or linkages, they had and were placed into groups based on their connectiveness. Analysis of nodes identified 29 Key Nodes (K1-29) with three or more edges, 17 Binary Nodes (B1-B17) with two edges, and 54 Singular Nodes (S1-54) with only one edge. The nodes formed 10 separate Supply Groups (SG1-10), and the details of these supply groups can be seen in Table 3.5. The SG's differed in specialties such as local or international trade, albino species, and threatened species. Specialties were selected if 30% or more of the supply applied to that specialty (n=111). A visual representation of the social network, centered around the supply groups, can be seen in Figure 3.5. At the center of this figure are the supply groups and the linkages between them are represented by lines connecting to other nodes that are scaled by their involvement (# of linkages). These links were

defined if one node posted the same individual for sale as another node. These results suggest that supply groups have formed in the OWT, and many individuals form large networks that are collaborating with each other. The main outcome is that of the 16,392 individuals traded, 64% of the individuals traded were by the supply groups, and this emphasizes the heavy hand they have in the OWT.

Table 3.5: The supply groups found on Instagram and Facebook and their social network analysis metrics along with their specialties based on the posts published by the nodes in each group.

supply group	# nodes	degree of centrality	# key nodes	specialty	# individuals
SG1	12	23	6	International	640
SG2	9	12	2	Albino, Local, Threatened	2203
SG3	4	7	2	Local, Threatened	1387
SG4	12	16	2	Albino, Local, Threatened	498
SG5	18	20	5	Local, Threatened	2522
SG6	3	7	3	Albino, Local, International	172
SG7	28	34	6	Local, Threatened	1133
SG8	4	6	1	Albino, Local, Threatened	1043
SG9	7	15	1	Albino, Local, Threatened	165
SG10	3	6	1	Local	652

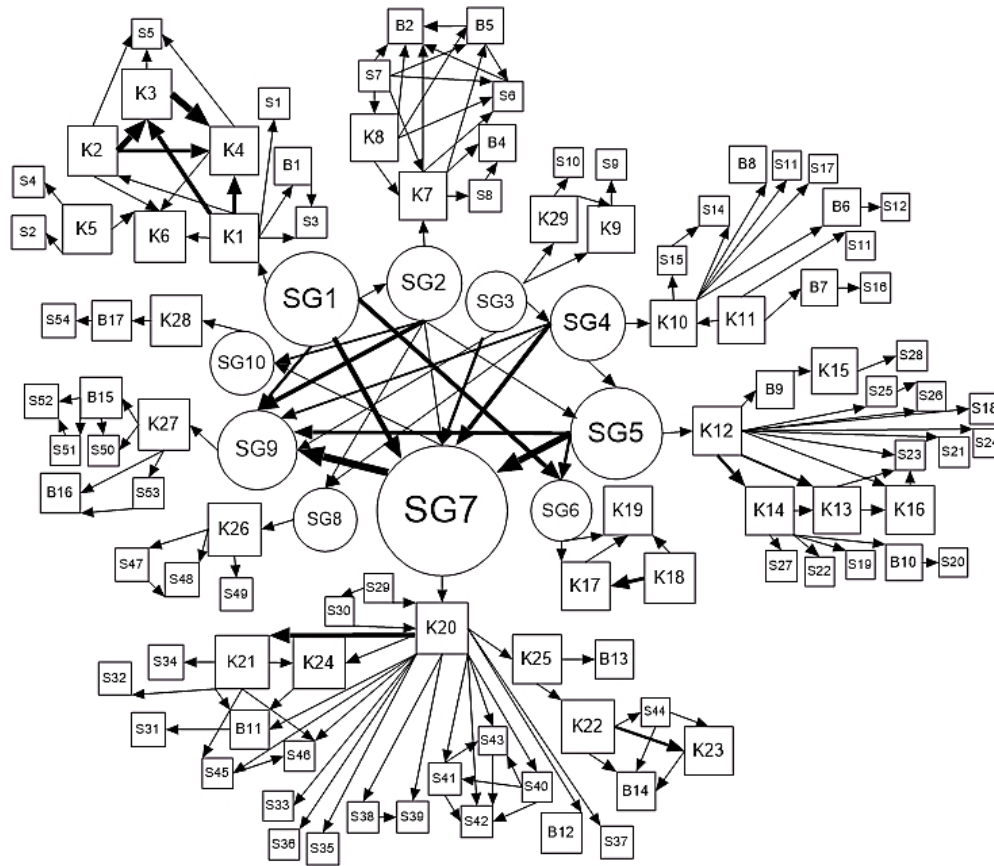


Figure 3.5: The network structure of the supply groups with lines (i.e., edges) that are larger when a link is stronger, and circles represent groups while squares represent nodes. Each unit is titled supply group (SG#), key node (K#), binary node (B#), or singular node (S#).

3.3.5. Geography

Geographic location was identified in 81 cities across Indonesia for 205 of the sellers. The remaining 22% of sellers do not openly reveal their geographical location (n=264). Trade through Supply Groups (SG's) occurred in 39 of the identified cities (n=81). A heat map of seller locations as well as supply group trade locations (red circles) can be seen in Figure 3.6. Most sellers (69%) are in Java (n=205). A global heat map of potential source countries can be seen in Figure 3.7. The international trade is most likely sourced from Africa (49.6%), other Asian countries (29.3%), and South America (24.6%) (n=1,033).

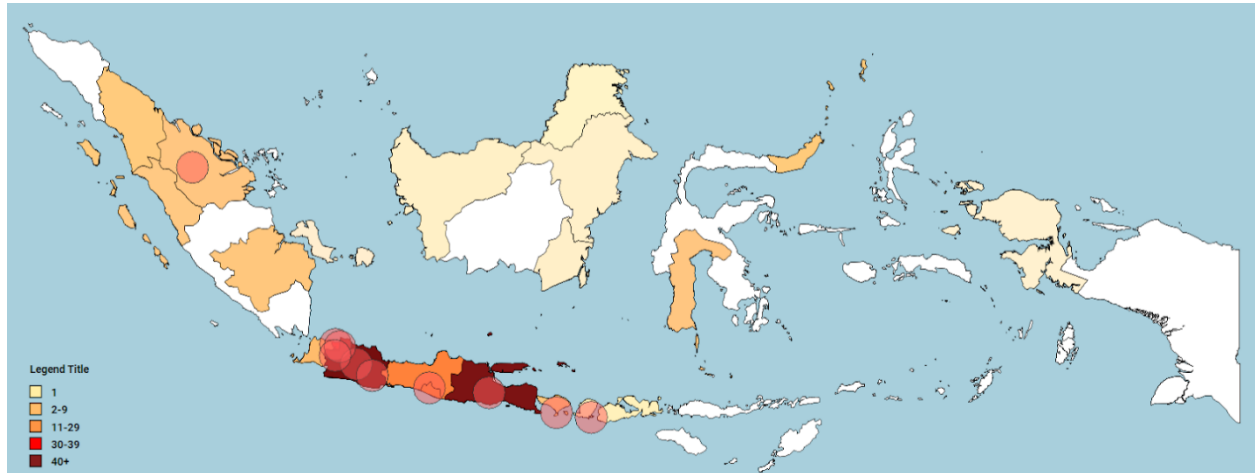


Figure 3.6: Seller locations are indicated by this heat map of Indonesia's districts, and areas where supply groups operate are identified by red circles on the heat map.

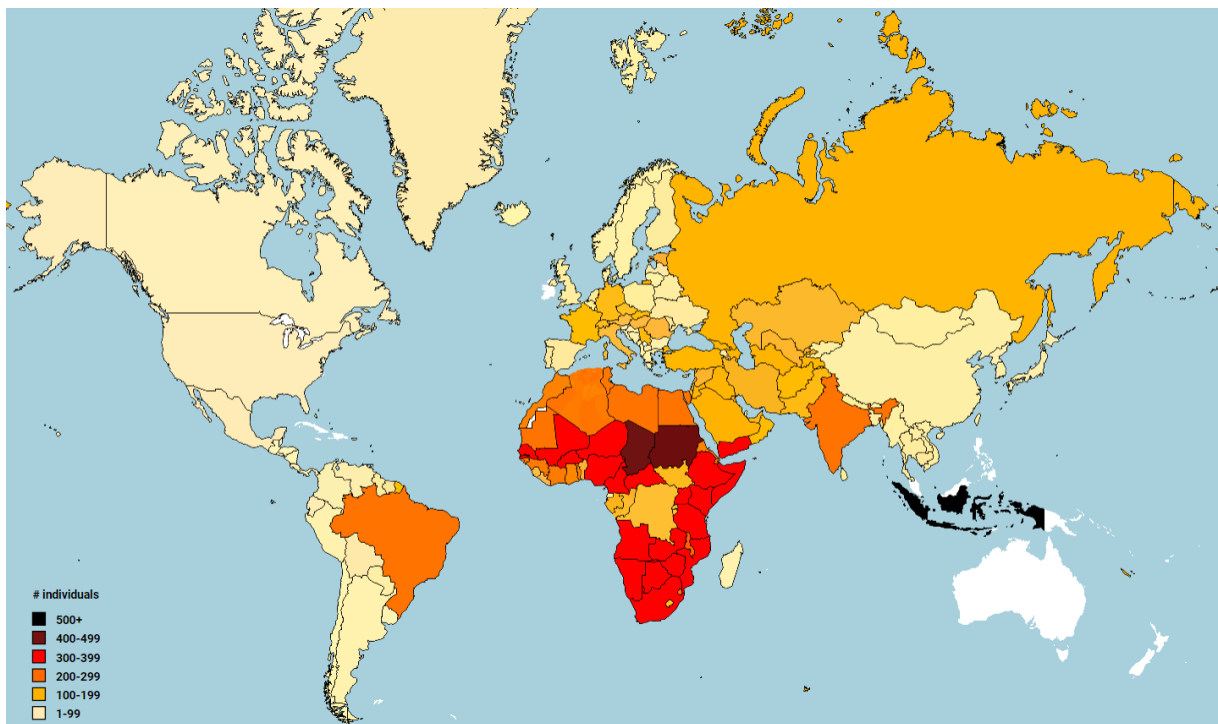


Figure 3.7: The visual of the international trade and the potential source countries based on home range data from detailed in the IUCN Red List database (IUCN, 2023).

3.4. Discussion

The OWT on Instagram and Facebook in Indonesia is extremely prevalent for mammalian species, and the networks are vast (Feddema et al., 2021; Thomas et al., 2021). Profiles used to advertise the OWT have a high average profile reach (2506 followers or friends), and 34% of profiles have a profile reach of more than 2,000 followers or friends. Additionally, profiles have a relatively medium average trade size (47 individuals) even though 75% of profiles have a trade size less than 40 individuals (Gore et al., 2021; Verissimo & Wan, 2019). About 15% of profiles (n=386) were deleted in this study which has been seen in other studies (Nehemy et al., 2022; Wyatt et al., 2022). This is a rather low rate when the enormity of the OWT is considered (Nijman et al., 2021). Additionally, 83% of deleted profiles have a large profile reach (2,000-9,999 followers or friends) which increases their exposure and overall likelihood of being reported. However, approximately 55% the profiles deleted contributed less than 10 individuals to the OWT (n=60).

Trust and safety are important to sellers and buyers in the online wildlife trade. This is probably because 90.9% of the trade found in this study is either illegal under Indonesian law and/or supposed to be regulated by CITES which is reflected in other studies (n=16,392) (Harrison et al., 2016; Sung et al., 2021). Sellers make a point to inform potential buyers that they can be trusted and further assure buyers that trade with them is safe. Usage of Rekber in the flow of money furthers the importance of trust and safety to actors and is used to ensure no one is scammed and transactions won't be traced back to them (Bears, 2019; Nijman, 2022; Nurbandi, 2022). This is further supported by sellers' insistence that No COD or PCB is allowed (Bears, 2019; Nijman, 2022; Nurbandi, 2022). The presence of testimonials in sellers' posts also points to a desire to prove one's trustworthiness and to assure buyers that trade with them is safe (Wong, 2017). All this information identifies an important point- actors in the online wildlife trade are aware that this trade is illegal.

Carnivora species represent 82.4% of the trade (n=16,392). Although Primates only constitute 15.1% of the trade (n=104), 78.7% of the trade in threatened species were also in primate

species (n=3,397). Additionally, 61.5% of the international trade was also in primate species (n=50) (Alves et al., 2013; Blair et al., 2017; Morcatty et al., 2022; Nijman et al., 2017). The Sunda Pangolin (CR) was traded by 15.9% of sellers (n=264) and averaged 1.5 individuals per seller. Gibbons are also an area of concern with specific focus on the Agile Gibbon and Silvery Gibbon. The trade of Slow Loris' and tigers are present and additionally concerning. These species may be sold in smaller numbers in comparison to common species, but their use and trade by a higher percentage of sellers indicates demand. Their biological factors influence the population size of the species, further identifying these species as greatly threatened by the OWT, and these factors should be considered when conducting future research (Yin et al., 2020). The IWT constituted for approximately 40.5% of the trade seen based on Indonesian law. The IWT is also furthered by the overwhelming 85% of the international trade that is supposed to be regulated by CITES, emphasizing the correlation between the OWT and the IWT (n=16,392).

Social media clearly increases the flow of information, and posts are used to provide all relevant, perceived legal information between actors (Song et al., 2020). Posts are also used by sellers to market wildlife in a way that attracts buyers, revealing information about buyer preferences and potentially revealing the future use & trade (Feddemma et al., 2020; Krishna et al., 2019; Nuno et al., 2018; Sung & Fong, 2018). For example, terms like tame or friendly and details about individual age and sex might indicate future use as pets (Hausmann et al., 2023; Liu et al., 2016; Nuno et al., 2018; Thomas-Walters et al., 2021). Either way, all posts, and the information they provide, are against the rules and regulations of both Instagram and Facebook and adds to the illegal stature of this trade (Mills, 2017; Sirait et al., 2018). Caption data revealed that specific terminology is used in the OWT and includes actor titles or roles as well as the sourcing and flow methodology (Phelps et al., 2016).

SNA revealed that sellers are using social media to form networks with varying relationships that can be personal or business-like. When comparing the key nodes, binary nodes, and singular nodes, it is clear that most of the sellers are singular with less of an effect on the network. Even so, the network has 29 Key Nodes that represent the network and influence they

have within it. The binary nodes may represent sellers that are starting to expand within the network and may become a key node in the future. Instances that involve supply groups (SG's) must be facilitated by a common supplier or a key seller in the supply group (SG) (Feddema et al., 2021; Feddema, 2022; Sung & Fong, 2018). This actor most likely has the wildlife individuals posted for trade but simply sends media to other sellers in the supply group (SG) for posting by the 38.6% of other sellers involved. Seller's use of a supplier or involvement in a supply group (SG) evidently increases their trade size, increases their trade in threatened species, and increases their involvement in the international trade (Feddema et al., 2021; Feddema, 2022). It should be noted that among all sellers, but especially these supply groups (SG's), albino individuals are in demand (Feddema et al., 2020; Sung & Fong, 2018; Van et al., 2019). It is probable that these individuals are considered a rarity, defined as a less populated species that the culture seeks, and seen by Van et al., (2019) with albino turtles being priced higher than non-albino turtles. About 70% of the supply groups (SG's) specialize in the trade of albino individuals.

3.5. Conclusion

The role of social media and marketing, social network analysis (SNA), and species-specific analysis in the OWT should be further investigated (Costa, 2021; Feddema et al., 2021). Future studies should focus on gathering more OWT related data such as prices or expanding the focal species to further understand the OWT system that is now so prevalent (McNamara et al., 2016; Tow et al., 2021). This information is needed for demand reduction campaigns that rely heavily on reported data of consumer preference or demand, market power, and supply chain dynamics (Margulies et al., 2019; Thomas-Walters et al., 2020; Verissimo & Wan, 2019). The expansion of the internet does not indicate this trade will be slowing down, and researchers, scientists, and agencies need to adapt to the new system the OWT presents us with. Hopefully, in time, we will be able to learn enough to effectively reduce the wildlife trade present in our natural world.

Chapter 4: Social media marketing as a strategy in the OWT

4.1. Introduction

Social media is a tool used by over 65% of adults for socializing, networking, and conducting business activities through the creation, sharing, and exchange of user-generated content by social media users (Aichner et al., 2021; Perrin, 2015). Benefits of using social media include accessibility, speed, interactivity, longevity, and reach- all met with Social Networking Services (SNSs) such as liking, commenting, and sharing other user's social media posts. Although 70% of social media users use it for personal use and socialization, businesses are rapidly increasing their usage (Aichner et al., 2021; Baird & Parasnis, 2011; Henderson, 2020). Social media marketing is used by over 89% of social media users, and for businesses, this involves the use of social media platforms to market a business's products or services by communicating and influencing buyers (Evans, 2010; Henderson, 2020). This marketing strategy requires little to no money, locates a new consumer market for businesses, and provides businesses the opportunity to give new information about their product or service (Evans, 2010; Sajid, 2016). Social media marketing is now being used in the OWT, and an overview of this process can be seen in Figure 4.1 (Banjade et al., 2020; Feddema et al., 2021; Kachan & Krishen, 2020; Nijman, 2010; Pascual & Wingard, 2021; TRAFFIC, 2008).

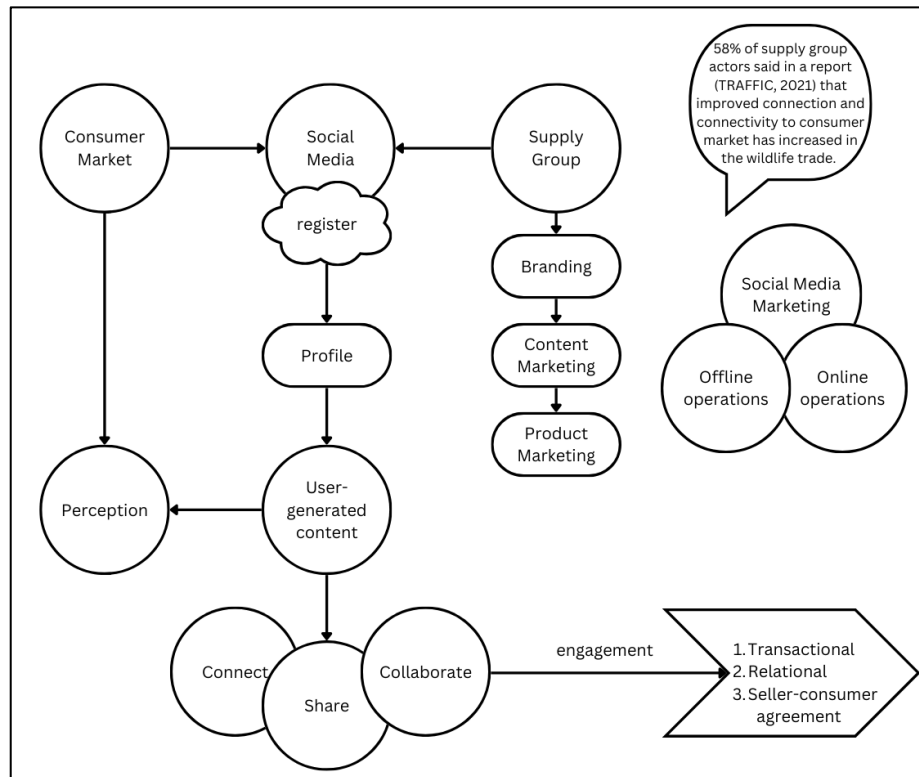


Figure 4.1: An overview of the role social media has in the OWT and how it contributes to the overall wildlife trade system.

Studies show that 57% of businesses use social media to create a network or community by delivering a variety of meaningful content that is also diverse, keeping the community interested and increasing engagement rates (Sajid, 2016). Engagement rates are measured through the number of people that interact with a social media post through liking, commenting, and sharing (Evans, 2010). Studies show that having a loyal consumer base is significantly related to a business' lifetime (i.e., length of operating) and therefore is an important factor for businesses to consider (Reinartz & Kumar, 2003). Businesses need to develop a particular set of skills and gain a full understanding of their consumer market to create content (Sajid, 2016). Their strategies may include: 1) creating a detailed profile biography; 2) creating media content that varies; and 3) creating captions that are informative (Sajid, 2016). User-generated content created specifically for consumer markets increases post engagement rates by over 62%, and directly informative content, such as stating the product or service is being sold cheaper, has especially high engagement rates (Ansari & Mela, 2003). The

perception of a business and its products or services is formed based on their user-generated content and this has a positive influence on consumers' purchase behavior which reportedly increases after interacting with a business's content (Kumar et al., 2016; Schivinski & Dabrowski, 2016). This chapter will investigate Social Networking Services (SNSs) but also the marketing strategies called branding, content marketing, and product marketing. Branding is a social media marketing strategy that has increased on social media and involves the creation of a brand narrative orchestrated by businesses through their content (Gensler et al., 2013; Sajid, 2016). Additionally, content marketing focuses on distributing information relevant to the consumer market to attract users that are most aligned with the product or service (Evans, 2010). Finally, product marketing is a strategy that focuses on the product and bringing it to the market (Evans, 2010). These three social media marketing strategies will be assessed in this chapter through the lens of the OWT on Instagram and Facebook in Indonesia involving mammalian species.

4.1.1. Aims, objectives, and research questions

It is predicted that sellers will use Social Networking Services (SNSs) to implement marketing techniques and that these SNSs make it easier to do so. Regarding branding, it is predicted that OWT sellers will use branding techniques to portray themselves as a business and engagement rates will be higher for those that do. For content marketing, it is predicted that terminology will play a large role in the strategy, and terminology may be unique to the network. Product marketing will also reveal the species demanded by this network of sellers and provide insight into the consumer market. Please see the aims, objectives, and research questions in Table 4.1.

Table 4.1. This table shows the aims, objective, and research questions for Chapter 4 focusing on social media specifically and the usage of marketing techniques.

category	details
Aims	Analyze the marketing strategies used by sellers in the OWT on Instagram and Facebook in Indonesia trading mammalian species
Objectives	1) Complete a social media investigation to identify profiles involved in the OWT on Facebook and Instagram in Indonesia trading mammalian species 2) Use web scraping to collect marketing information from social media profiles and posts 3) Utilize data triangulation to assess branding, content marketing, and product marketing
Research Questions	1) How has social media become a form of marketing in the OWT on Facebook and Instagram in Indonesia?

4.2. Methodology

4.2.1. Social media platforms

The social media platforms used in this study are Instagram and Facebook. Facebook is one of the most popular social media platforms with over 2.449 billion users and is used by 79% of the world's online users- most daily (Greenwood et al., 2016). Instagram is the second most popular social media platform according to (Greenwood et al., 2016) and has grown drastically to over 1 billion users as of 2019. Greenwood et al., (2016) indicates that 63.5% of social media users use both Facebook and Instagram daily. Facebook and Instagram have become the dominant marketing medium of wildlife, and both platforms have implemented measures to reduce the OWT (Mills, 2017; Sirait et al., 2018). Instagram introduced a "warning" in 2017 on hashtags that are deemed dangerous to wildlife (Mills, 2017) in hopes of controlling the trade of wildlife on their platform. Facebook has presented similar measures. However, despite both platforms stating the OWT is against their rules and regulations, the OWT persists on both Facebook and Instagram (Banjade et al., 2020; Feddema et al., 2021; Kachan & Krishen, 2020; Nijman, 2010; Pascual & Wingard, 2021; TRAFFIC, 2008).

4.2.2. Social media investigation

A social media investigation was conducted on Facebook and Instagram to determine profiles involved in the OWT in Indonesia. Terminology was searched in both English and Indonesian to

locate the profiles, and these can be seen in Chapter 2. Profiles were selected if they met the following guidelines: 1) clear involvement in the OWT; and 2) stated they were in Indonesia. Profiles identified during the social media investigation were then web scraped for data.

4.2.3. Web scraping

Profile data was scraped from each of the selected profiles using Phantom Browser, 4K Stogram, and Bulk Image Downloader, and this included the name, location, and biography. Next, post data was scraped from each of the profiles also using Phantom Browser, and this included captions, photographs and/or videos, tagged locations, and engagement rates (i.e., number of likes and comments). This data was then triangulated to analyze the social media profiles and their use of SNSs, branding, content marketing, and product marketing.

4.2.4. Data triangulation and analysis

4.2.4.1. Social Networking Services (SNSs)

Post data was sorted based on relevance, and the number of posts in this study as well as the average engagement rates for these posts were noted. The percentage of posts that used hashtags was also noted, and the subject of these hashtags was assessed based on species, wildlife trade terminology, geographic information, or information random to the study. Hashtags that were flagged by Instagram and Facebook for being linked to the OWT were also noted. Lastly, the use of code words in hashtags was noted.

4.2.4.2. Branding

Profiles were divided into three branding categories based on their profile name: 1) business, 2) personal, or 3) random. The percentage of posts, the average profile reach, and the engagement rates for posts were compared for each branding category. Additionally, photographs and videos were assessed to identify branding in the media data. Profile biographies were also investigated by assessing the terminology used. Profiles that rebranded (i.e., changed their branding name) were also assessed by analyzing the profile reach and the number of marketed wildlife before and after rebranding. Co-branding (i.e., branding between

multiple sellers) was also assessed, and a social network analysis was created using ClickCharts based on co-branding data.

4.2.4.3. Content Marketing

Posts were first sorted based on whether they had a caption or not, and the engagement rates for posts with a caption versus without a caption was compared. Next, the terminology used in the captions was assessed and a figure was created using NVivo statistical analysis to show this. Engagement rates were also compared between posts that used photographs and posts that used videos. Additionally, posts that tagged locations were compared based on engagement rates. Terminology was then compared between branding categories and engagement rates.

4.2.4.4. Product Marketing

Captions were first assessed to determine the species that was being marketed in posts, and graphs were created to compare Phylum's and then additionally compare *Mammalia*. Next, *Carnivora* and *Primates* were compared. Lastly, the media was assessed for marketing techniques.

4.3. Results

4.3.1. Social Networking Services (SNSs)

There were 70,508 posts found, and 40% (n=70,508) of these posts were used in analysis. The other 60% of posts did not relate to the wildlife trade and were overall the personal posts of sellers. The average engagement rate was 118 for likes and 4 for comments. About 41.2% of the posts (n=28,203) used hashtags, and the breakdown of these hashtags can be seen Figure 4.2. The hashtags labeled 'other' includes wildlife trade hashtags (13.4%), geographic location hashtags (2.9%), and random hashtags (21.7%) (n=11,620). In the investigation of the hashtags used by sellers on Instagram, 20 hashtags were flagged by Instagram for animal abuse per the platforms policy, and these hashtags can be seen in Table 4.1. Some of these hashtags are in English and some are written in Indonesian. Although some of the hashtags don't relate to this

study, they were all used by sellers investigated in this study and suggest the trade of species not analyzed in this study. It was noted that sellers change the wording of hashtags to use code words similarly seen in other studies (Alfino & Roberts, 2020).

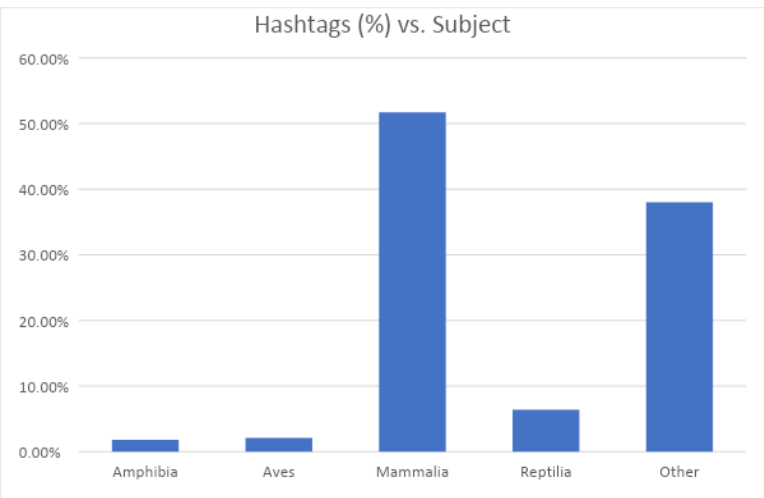


Figure 4.2: The percentage of hashtags for each order and a section for 'other' hashtags seen. Hashtags referencing mammals were the most marketed hashtags followed by hashtags that fell under the category of 'other'.

2116 Table 4.1: The flagged hashtags used in this study to market wildlife in the OWT. The most
 2117 frequently used hashtag terminology is ‘jual’ in Indonesian or ‘sell’ in English.

Hashtag	Translation
#Jualmonyet	Sell monkey
#Jualreptil	Sell reptile
#Jualreptile	Sell reptile
#Jualkadal	Sell lizard
#Monkeyselfie	Monkey selfie
#Slothselfie	Sloth selfie
#Exoticanimalforsale	Exotic animal for sale
#Jualmonyetpantai	Sell monkey beach
#Wildlifselfie	Wildlife selfie
#Turtleselfie	Turtle selfie
#Dolphinkiss	Dolphin kiss
#Tigerselfie	Tiger selfie
#Koalaselfie	Koala selfie
#Jualotter	Sell otter
#Jualbinturong	Sell binturong
#Elephantride	Elephant ride
#Jualmonpay	Sell monkey
#Jualburung	Sell bird
#Jualular	Sell snake
#Jualmonyetpantaimurah	Sell monkey beach cheap

2118

2119 4.3.2. Branding

2120 Profiles were sorted into three categories based on their names (business, personal, and

2121 random), and this data can be seen in Table 4.2. It was noted that occasionally sellers have

2122 multiple profiles that are branded based on the marketed species where one profile markets

2123 reptiles and another profile markets mammals. Business branded profiles create logos that they

2124 use in photographs and videos, and an example can be seen in Figure 4.3. About 24.5% of

2125 profiles (n=386) utilized profile biographies as a further branding strategy. Of these profiles,

18.7% branded themselves as a seller, 21.1% branded the profile as a store or shop with 36.4% stating the profile was run by the owner, 2.2% branded themselves as a collector, and 1.1% branded themselves as a reseller (n=386). There are 34.1% of these profiles (n=386) that branded their profile as being linked to animals. An additional 4.4% branded the profile and its contents as a hobby, while 5.5% branded themselves as an animal lover (n=386).

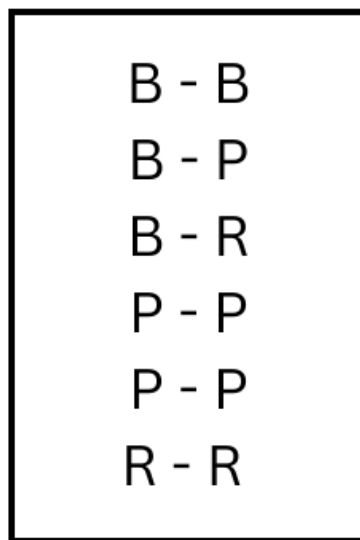
Table 4.2: Comparison of the statistics between each branding category. The most common category is business branded profiles which had higher profile reaches and higher average engagements. Personal branded profiles had the largest percentage of posts.

Branding category	# profiles	% of posts	Avg. profile reach	Avg. # likes	Avg. # comments
business	154	21.4	3184	302	10
personal	120	48.6	2325	95	2
random	112	30.0	1074	25	2



Figure 4.3: A photograph from one Instagram profile that branded themselves as a business; more specifically a pet shop. Invested actors frequently made content with specific brands and created hats, stickers, etc.

2140 There are 12 profiles that displayed re-branding in this study (6 original profiles and 6
2141 rebranded profiles), and they can be seen in Figure 14: B for business, P for personal, and R for
2142 random. Profile reach stayed the same for all rebranded profiles except for one Instagram
2143 account that increased by 6249 followers. There were three rebranded profiles that marketed
2144 the same amount of wildlife after rebranding, two rebranded profiles that increased marketing
2145 by more than 20 individuals, and one rebranded profile decreased in the amount of marketed
2146 wildlife.



2147
2148 Figure 4.4: The rebranded profiles by their branding before and after the rebrand. Only two
2149 profiles changed branding categories during the rebrand, and most stayed in the same
2150 category.

2151
2152 Co-branding also occurred when sellers tag other sellers in their posts marketing wildlife. There
2153 were 19 sellers that exhibited co-branding through tagging other sellers in posts marketing
2154 wildlife, and they are labeled A-S in a social network analysis (SNA) that can be seen in Figure
2155 4.5.

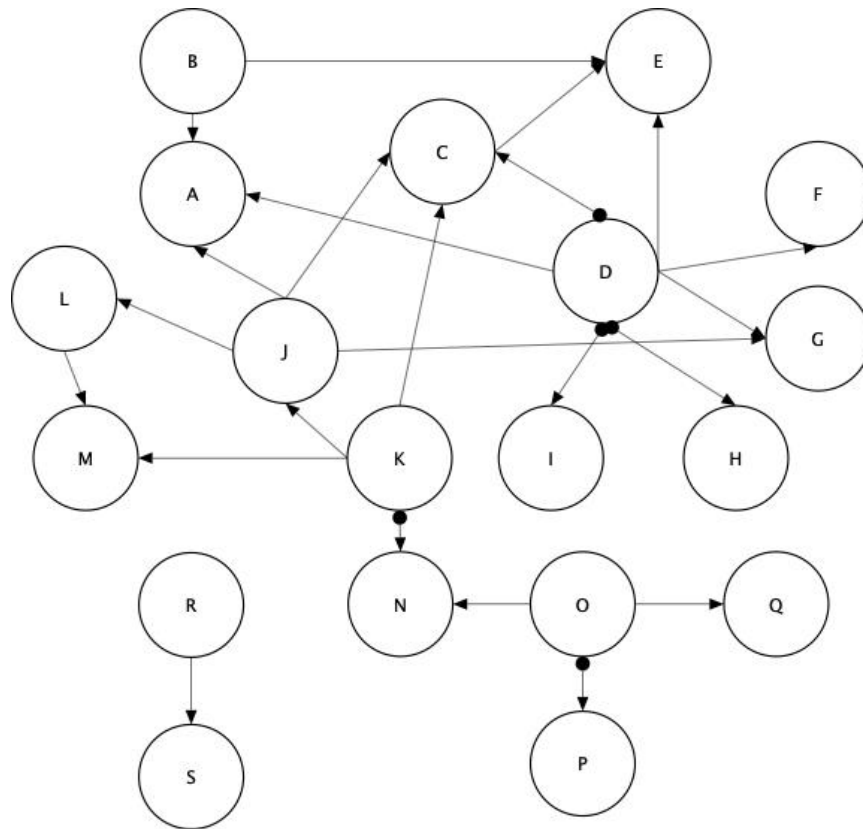


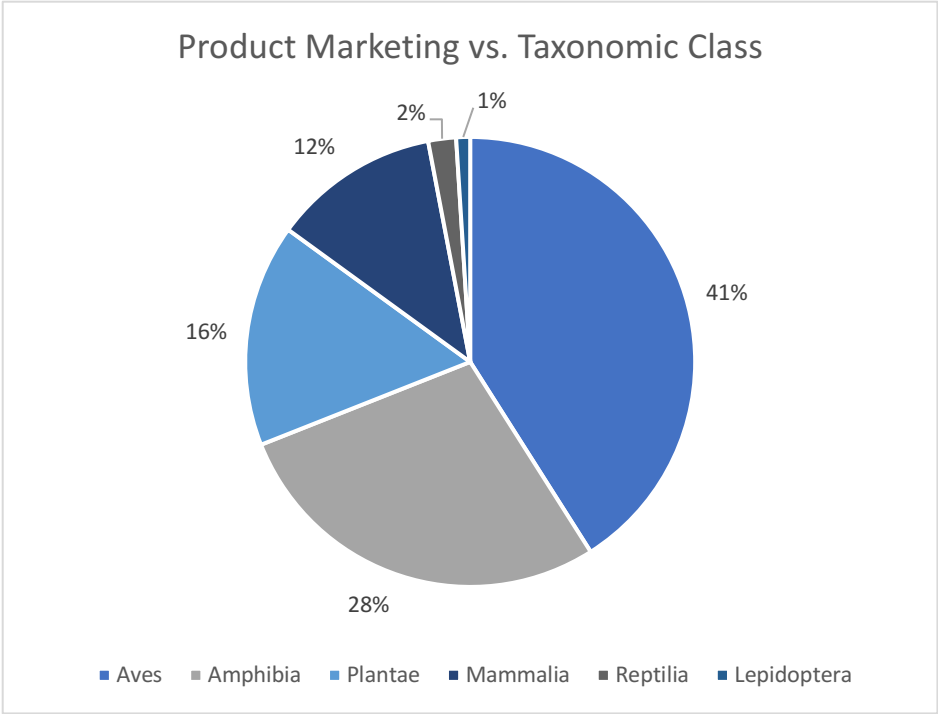
Figure 4.5: Social network analysis of the co-branding seen between 19 actors in the OWT in Indonesia. The black circle represents a mutual co-branding effort between the two nodes.

4.3.3. Content Marketing

There are 38,083 posts with captions and 5,843 posts without captions. Engagement rates for posts including captions are found to average 83 more likes and 4 more comments than posts without captions. NVivo statistical analysis was used to assess the terminology in the captions, and a figure can be seen in Figure 4.6. Additionally, there are 32,530 photographs and 11,396 videos posted by the selected profiles. Posts with videos are found to have higher engagements rates averaging 38 more likes and 4 more comments than posts with photographs. Only 14.0% of posts (n=28,203) tagged a location in their content, and these posts have higher engagement rates overall, averaging 91 more likes and 3 more comments than posts without a location tagged.

2185 4.3.4. Product Marketing

2186 The captions were also used to assess product marketing, and this can be seen in Figure 4.7 and
2187 Figure 4.8. Posts advertising pets averaged 6 more comments than other posts. Additionally,
2188 posts marketing albino individuals averaged 70 more likes and 2 more comments than other
2189 posts.



2190
2191 Figure 4.7: Breakdown of each taxonomic class marketed by actors using product marketing
2192 strategies. This data suggests that many actors trade species other than mammalian species.

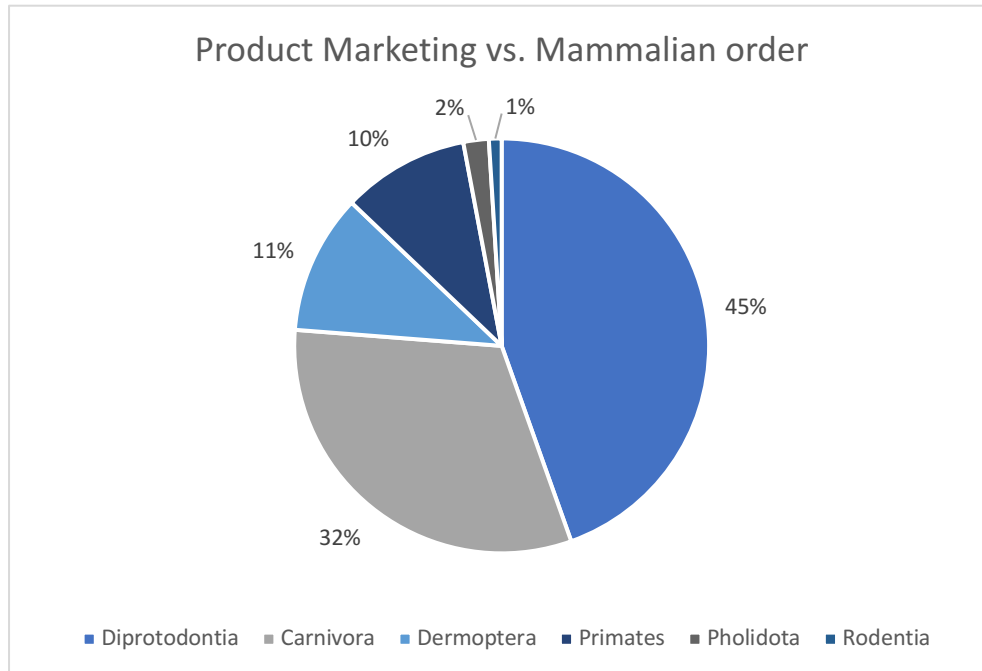
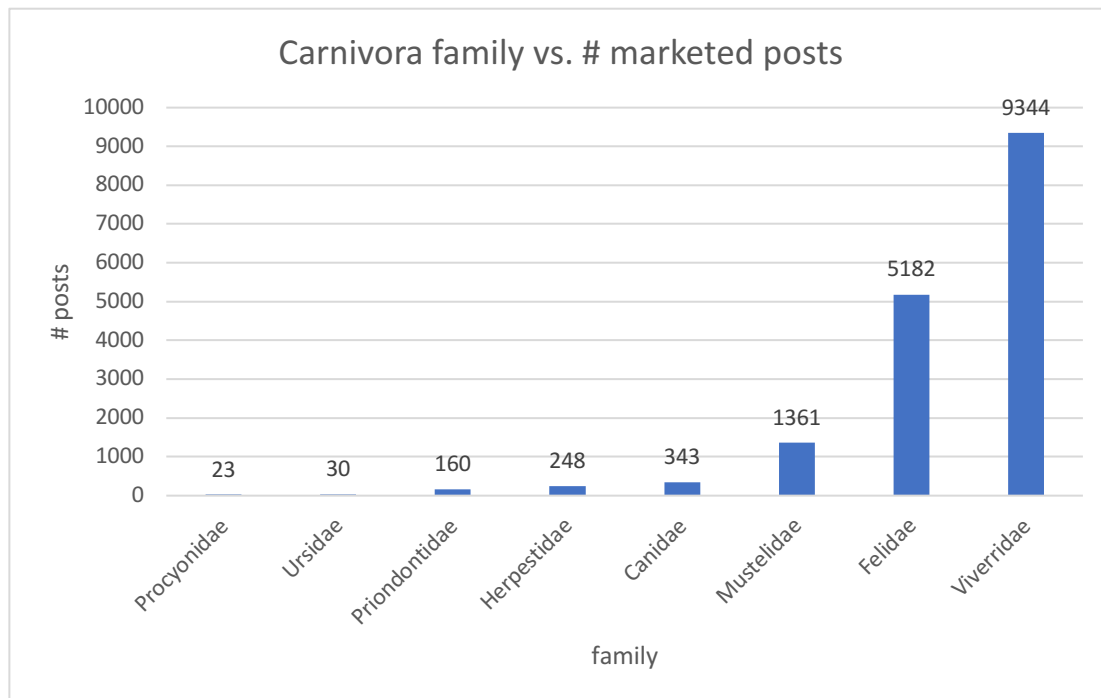


Figure 4.8: The mammalian orders marketed in posts published by the focal group. Most of the included orders highlight the focal species of this study.

Posts that marketed Carnivora and Primates were broken down by family, and the results can be seen in Figure 4.9 and Figure 4.10. For Carnivora species, the taxon family of Viverridae (i.e. civets) was marketed the most in posts followed by Felidae and Mustelidae. Primates were more likely to be marketed in a general context, although Hylobatidae, Callitrichidae, and Cercopithecidae families were marketed in over 100 posts. In comparison, Carnivora species were marketed more than primate species, and it was noted that many specialized posts referenced only one available species.



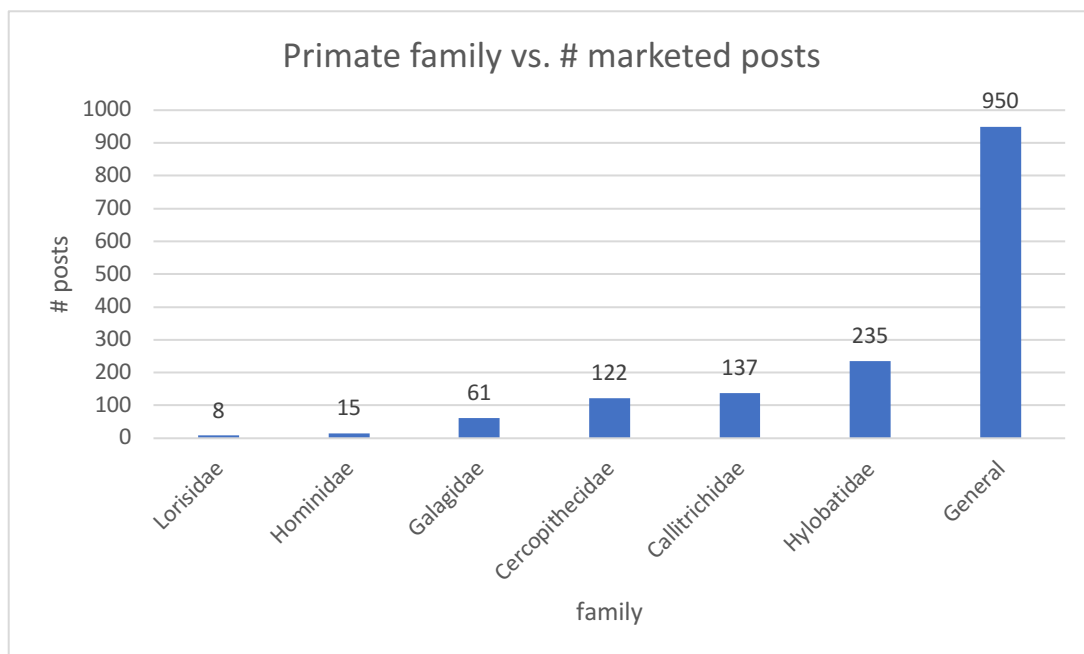
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Figure 4.9: Actors marketed Carnivora families in their posts, and this bar graph breaks down the captions referencing the different families. Out of the sixteen Carnivora families listed on the IUCN Red list, these are the eight that were mentioned.

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Figure 4.10: Primates were mentioned in hundreds of posts published by actors, and this bar graph breaks down the posts into mentions of each primate's taxon family.

2212

Marketing was demonstrated in the media data when individuals were clothed or posed, and effort to use product marketing strategies included the usage of backgrounds like fake grass or a bare wall that enhanced their photographs. An example can be seen in Figure 4.11. Primates were more likely to be marketed wearing clothes than other species due to their likeness to humans, but most species were marketed in some way through posts.



Figure 4.11: This figure represents two photographs taken from an Instagram account and a Facebook account that represent two common ways products were marketed- clothing and fake grass.

4.4. Discussion

This study revealed that social marketing strategies are being used by sellers in the OWT to further their businesses on Facebook and Instagram. It is confirmed that SNSs are used by sellers, and the marketing strategies investigated (branding, content marketing, and product marketing) were used. For branding, over 150 profiles labeled themselves as a business, and some even sold products like T-shirts and hats with the seller's brand. Seller's content wrote a

brand narrative that placed them higher in the trade chain than other sellers without a brand, and the large number of sellers using branding as a marketing technique reflect the increase of branding reported in the literature (Gensler et al., 2013; Sajid, 2016). Additionally, content marketing was specific to this network, and product marketing reflected a consumer demand that was investigated which are both discussed below.

In regard to SNSs and in alignment with other research, posts with captions (n=38,083) received higher engagement rates (+83 likes; +4 comments) than posts without a caption (n=5,843) (Evans, 2010). Additionally, although 74% of media data displayed photographs, posts that included a video (n=11,396) had higher engagement rates (+38 likes; +4 comments) as well as the 14% of posts that tagged a location (n=3,940) (+91 likes; +3 comments). This data suggests that the more SNSs used, and sometimes specific SNSs over others, provide an upper hand over other sellers, and introduces marketing techniques more effectively.

The most important aspect of marketing was the terminology. Terminology is an important factor in OWT marketing, and the most common words used were seller, animal, lover, pet, ready, and send. Once again, this highlighting the type of actors, demand, and consumption intentions. It is suggested that sellers use the same terminology or hashtags to find other actors in the OWT community (Phelps et al., 2016). This is especially important for business branded profiles that often use the same terminology to trade wildlife and examples can be seen in Table 4.3.

2258 Table 4.3: The unique terminology used by business branded profiles when advertising wildlife
 2259 products in the OWT. Large percentages of these profiles share the use of this terminology.

terminology	% business profiles
cheap	73.1%
no COD	81.1%
no PCB	76.3%
rekber	80.3%
smart	88.5%
sold out	77.8%
stock	76.1%

2260
 2261 When the types of profiles were investigated, business branded profiles had the highest
 2262 average profile reach (3184 followers or friends) and the highest engagement rates (+302 likes;
 2263 +10 comments). Personal branded profiles did have the highest percentage of posts (48.6%)
 2264 (n=28,203), but this suggests their content differs from business branded profiles and may lean
 2265 towards a more personal outlook. Rebranding profiles didn’t seem to have much of an effect on
 2266 social media marketing, and co-branding was only displayed by 7% of sellers (n=264) (Goi & Goi,
 2267 2011; Paydas Turan, 2021). Branding terminology used by sellers in the OWT can be seen in
 2268 Figure 4.4.

2269
 2270 Table 4.4: The branding terminology used by actors in this study when marketing wildlife
 2271 product. This data suggests that some actors reference their position in the trade chain during
 2272 marketing.

terminology	% branded profiles
owner	36.4%
store/shop	21.1%
seller	18.7%
animal lover	5.5%
hobby	4.4%
collector	2.2%
reseller	1.1%

2273
 2274 Consumer preference and demand in the OWT was revealed by analyzing captions and
 2275 terminology, assessing engagement rates, and evaluating hashtag contents (McNamara et al.,

2016; Nuno et al., 2018). Engagement rates were higher for posts that advertised pets (+6 comments) and even higher for posts advertising albino individuals (+70 likes; +2 comments). This suggests higher consumer demand for species that fall into these categories (Feddemma et al., 2020; Hughes et al., 2023; McNamara et al., 2016). Overall, according to caption data, consumer preference and demand focused on birds (41%), amphibians (28%), plantae (16%), mammals (12%), reptiles (2%), and insects (1%) (n=38,083). In addition to this, evaluation of hashtag contents illustrated that over 50% of hashtags indicated mammalian species (n=11,620). Analysis of the captions referencing the studies focal species revealed a preference and demand for Diprotodontia species (45%), Carnivora species (32%), Dermoptera species (11%), Primate species (10%), and Pholidota species (2%) (n=38,083). Posts referencing Carnivora species mostly consisted of the taxon families Viverridae (9344 posts) and Felidae (5182 posts). Additionally, posts referencing Primate species were mostly in general terms (950 posts), and those that did focus on a taxon family referenced Hylobatidae (235 posts), Callitrichidae (137 posts), Cercopithecidae (122 posts), and Galagidae (61 posts).

Overall, this chapter shows that marketing techniques are being used in the OWT on Facebook and Instagram in Indonesia. Whether it be simple steps like adorning images with a backdrop or fake grass, or blatant strategies like using the terminology of the network to trade, sellers are now implementing marketing strategies to trade wildlife. These marketing strategies provide insight into consumer demand, and future initiatives should focus on the species mentioned above.

4.5. Conclusion

Future initiatives should consider implementing a demand reduction campaign on the social media platforms that host the OWT (i.e., Facebook and Instagram). Campaigns should focus on working with actors in the OWT to educate, reduce demand, and substitute involvement (Feddemma et al., 2020; Greenfield & Verissimo, 2019; Loebnitz et al., 2020; Margulies et al., 2019). The marketing data leads researchers toward demanded species, correct terminology, and examples of its use in the OWT which can be used to establish a marketing campaign in

2305 response to reduce the OWT (Feddema et al., 2020; Feddema et al., 2021; Wright et al., 2015).
2306 One researcher published two papers (Feddema et al., 2020; Feddema et al., 2021) testing this
2307 theory and illustrate the importance of marketing in understanding consumer demand and
2308 even state that this information could lead to a change in consumer behavior which is a future
2309 initiative that will be taken using this data (Feddema et al., 2020; Feddema et al., 2021).

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Chapter 5: Welfare implications in the OWT

5.1. Introduction

Wildlife is killed and captured each year in the billions for use in the wildlife trade (Wyatt et al., 2021). Animal welfare is compromised in many ways when introduced to the wildlife trade, and this includes animals used for farming, traditional medicine, pets or companion animals, and entertainment (Baker et al., 2013). Welfare refers to an animal's relation to its environment and can be measured for reference – a subject that some literature suggests is ignored by the public and scientific community (Broom, 1991; Wyatt et al., 2021). Animals can feel both pain and pleasure and are therefore labeled as sentient beings (Broom, 2014; Wyatt et al., 2021). Animal welfare is measured using the Five Freedoms: 1) Freedom from Hunger and Thirst; 2) Freedom from Discomfort; 3) Freedom from Pain, Injury, or Disease; 4) Freedom to Express Normal Behavior; and 5) Freedom from Fear and Distress (Mäekivi, 2018; Wyatt et al., 2021). It is believed that animals in captivity should have access to each of these freedoms, and some state that we need to “move past the Five Freedoms” into a “life worth living” (Mellor, 2016). Baker et al., (2013) states that, regarding welfare in the wildlife trade, “the intensity and duration of suffering depend on whether and how the animal is restrained, transported, kept, fed and watered, and either killed or used alive.”

There have not been many reports about welfare in the OWT, and this chapter aims to provide more insight into that field. A captive management plan should be created when keeping wildlife in captivity (Hutchins & Kreger, 2006), and factors such as sex, age, social rank, and individual needs should be considered (Hosey et al., 2013). It is important to remember that individuals differ based on the smallest things, and captive management plans should be comprehensive and thorough relating to each individual (Hosey et al., 2013; Hutchins & Kreger, 2006). In regard to pets, there can be a lack of knowledge and difficulty meeting standard welfare conditions (Schuppli et al., 2014). Hosey et al. (2013) explains that we need to take care of: 1) animal minds; 2) animal bodies; and 3) animal behavior when discussing welfare. The factors that affect these areas are in our control and includes housing, feeding, and human-animal interactions that can be uncomfortable, behavior changing, and dangerous to both

wildlife and human individuals (Hosey et al., 2013; Smith, 2008). This chapter will dive into these factors to explore the welfare of wildlife in the OWT in Indonesia.

5.1.1. Aims, objectives, and research questions

It is predicted that the social media investigation assessing welfare will show that the OWT in mammalian species in Indonesia on Instagram and Facebook does display violations of the Five Freedoms. These violations will relate to individuals' behavior, health, and conditions displayed in photographs and videos posted by sellers in the OWT. Violation simply refers to not meeting the Five Freedoms, and there is no law or regulatory body that defines this but rather the Five Freedoms used by scientists to monitor animal welfare. Table 5.5 lists the specific aims, objectives, and research questions for this chapter.

Table 5.1. This table explains the research aims, objectives, and research questions for Chapter 5 focused specifically on the welfare of wildlife in the OWT which is reportedly poor and has a negative impact on individuals.

category	details
Aims	Identify and monitor profiles involved in the OWR in Indonesia on Facebook and Instagram to monitor the welfare of individuals traded on these platforms
Objectives	1) Assess the photographs and/or videos collected during the social media investigation for welfare violations using the Five Freedoms
Research Questions	1) What are the welfare concerns of wildlife in the OWT in Indonesia?

5.2. Methodology

5.2.1. Social Media Investigation

A social media investigation was conducted on Instagram and Facebook – two popular platforms in the OWT based on past research (Kitson & Nekaris, 2020; Krishnasamy & Stoner, 2016; Siritwat et al., 2019; Xu et al., 2020). Both Facebook and Instagram have developed measures to reduce the OWT on their platforms. Although, there are not many studies about its effectiveness. All the profiles investigated on Instagram and Facebook are public and can be viewed by anyone with a profile. Despite this, measures were taken to protect the identities of

the profile owners. Profiles were selected for the study if the following criteria was met: 1) lives in Indonesia; 2) participant in the online wildlife trade; and 3) sells focal species on their profile.

5.2.2. Animal welfare assessment

Animal welfare in the OWT was assessed by comparing the photographs and videos posted by online profiles with the Five Freedoms discussed in the introduction – 1) Freedom from Hunger and Thirst; 2) Freedom from Discomfort; 3) Freedom from Pain, Injury, or Disease; 4) Freedom to Express Normal Behavior; and 5) Freedom from Fear and Distress (Mäekivi, 2018; Wyatt et al., 2021). For each species, welfare scores (1-3) were given for each freedom and then divided by five for an overall welfare score. The conditions for each welfare score (1-3) can be seen below in Table 5.2. Specific factors that were noted include enclosures, competition, human-animal interactions, inter-species interactions, and population size. These factors could only be recorded when shown in the photograph or video.

Table 5.2. This table displays the conditions considered for each of the Five Freedoms when providing a welfare score for a certain species.

Freedom	Welfare Score		
	1	2	3
Freedom from Hunger and Thirst	No food or water, high competition	Some food or water, some competition	Available food and water, no competition
Freedom from Discomfort	Little space availability, no shelter, crowded	Adequate space availability OR available shelter, some crowding	Available shelter, adequate space availability
Freedom from Pain, Injury, or Disease	Clear injury and disease or visible pain (2+)	One symptom such as obesity or skin lesions	Healthy coat or skin, no signs of pain/injury/disease
Freedom to Express Normal Behavior	Abnormal behaviors, unnatural conditions (2+), no socialization	Signs of socialization, some unnatural conditions (1)	Clear socialization, enrichment
Freedom from Fear and Distress	Clear expression of fear and distress in facial expressions, body movements, and vocalizations	Noted hazards and conditions that could potentially cause fear and distress	No signs of fear or distress

5.3. Results

The social media investigation found 3,401 photographs/videos that violated the five freedoms regarding welfare (Figure 5.1). Violations do not regard legality or law, but rather indicate the welfare concerns identified in the OWT, and this is not readily monitored by a government or police force. The most frequently violated freedoms are Freedom from Discomfort (34%) and Freedom to Express Normal Behavior (33%) (n=3,401). It should be noted that this assessment only includes the violations displayed in photographs and videos.

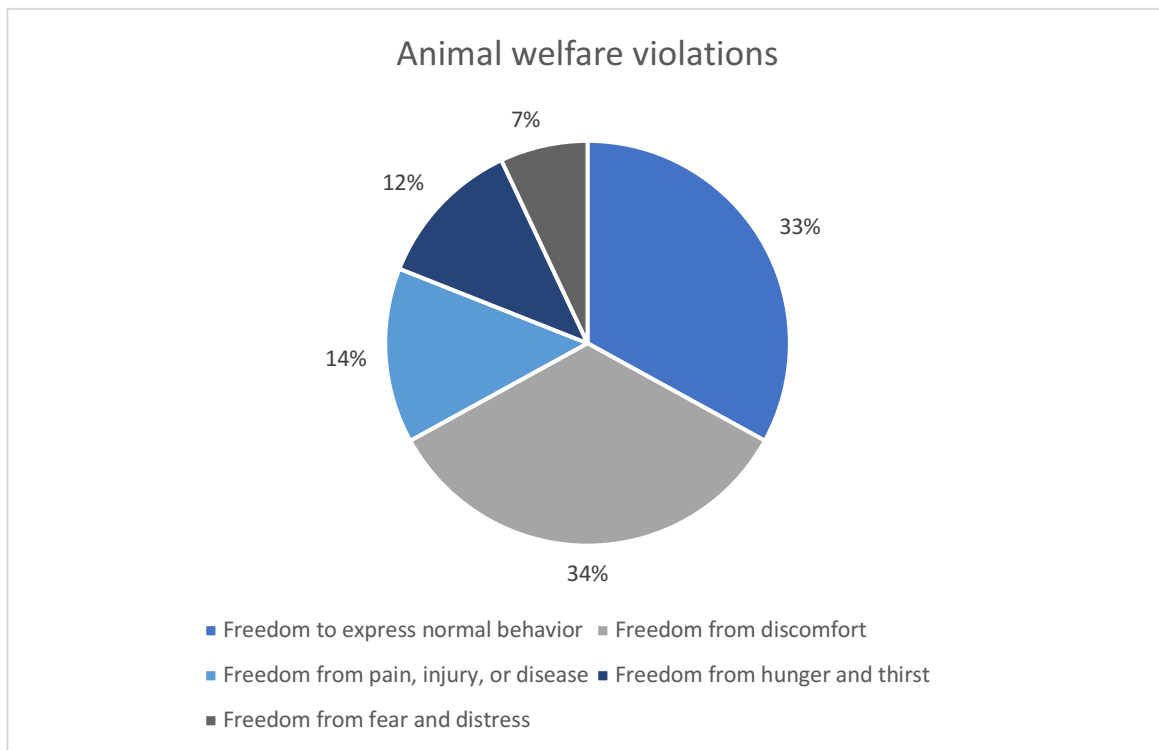


Figure 5.3: The break down violations of the Five Freedoms regarding frequency. This figure shows that all violations were displayed but some have a higher frequency.

Below, in Table 5.4, the top five factors that contributed to welfare violations are listed. The main area of concern is the enclosures used to house individuals in the OWT. Additionally, there were only 27 instances that enrichment was noted.

2421 Table 5.3: The top five factors that contributed to a lower welfare score when assessing the
2422 conditions of the OWT.

factor	# instances
Competition	72
Enclosure	191
Human-animal interaction	103
Inter-species interaction	34
Population size	84

2423
2424 The 16 species traded and assessed during the welfare investigation can be seen in Table 5.4.
2425 There were no welfare scores under 1.0 and the average welfare score was 3.3. The most
2426 common freedom violation came from the Freedom to express normal behavior and the
2427 Freedom from discomfort. It should also be noted that species traded in higher numbers
2428 seemed to have a higher welfare score than other species.

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2444 Table 5.4: This table lists the species traded when conducting a welfare investigation and the
 2445 number of individuals, the welfare score, and the freedoms violated are also listed.

Scientific name	Common name	# individuals	Welfare score	Freedom
<i>Hylobates agilis</i>	Agile Gibbon	27	2.1	Freedom to express normal behavior
<i>Catopuma temminckii</i>	Asiatic Golden Cat	30	1.3	Freedom from discomfort Freedom to express normal behavior
<i>Macaca fascicularis</i>	Common Long-tailed Macaque	262	2.3	Freedom from discomfort Freedom to express normal behavior
<i>Paradoxurus hermaphroditus</i>	Common Palm Civet	1247	2.8	Freedom from discomfort Freedom to express normal behavior Freedom from pain, injury, or disease
<i>Neofelis diardi</i>	Sunda Clouded Leopard	37	1.3	Freedom from discomfort Freedom to express normal behavior
<i>Melogale orientalis</i>	Javan Ferret Badger	113	2.9	Freedom to express normal behavior
<i>Presbytis comata</i>	Javan Surili	135	2.1	Freedom from discomfort Freedom to express normal behavior
<i>Paguma larvata</i>	Masked Palm Civet	231	2.7	Freedom from pain, injury, or disease
<i>Pongo spp.</i>	Orangutan	19	1.1	Freedom from discomfort Freedom to express normal behavior
<i>Lutra lutra</i>	Otter	714	2.5	Freedom from discomfort
<i>Symphalangus syndactylus</i>	Siamang	35	1.9	Freedom from discomfort Freedom to express normal behavior
<i>Hylobates moloch</i>	Silvery Gibbon	28	1.2	Freedom from discomfort Freedom to express normal behavior
<i>Nycticebus spp.</i>	Slow Loris	25	1.5	Freedom from discomfort Freedom to express normal behavior
<i>Verrucula indica</i>	Small Indian Civet	99	2.8	Freedom to express normal behavior
<i>Arctodaliidia trivirgata</i>	Small-toothed Palm Civet	125	2.4	Freedom from discomfort Freedom to express normal behavior
<i>Helarctos malayanus</i>	Sun Bear	274	2.1	Freedom from discomfort Freedom to express normal behavior Freedom from pain, injury, or disease

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2447 5.3.1. Freedom from Hunger and Thirst

2448 Assessing the Freedom from Hunger and Thirst must address that media data may not
 2449 accurately depict the entirety of welfare conditions of individuals, and a lack of food or water
 2450 does not mean individuals may have access outside of the cameras view. For that reason, it was
 2451 only noted if food or water were available and assesses the conditions that can be seen. One
 2452 condition noted was the presence of competition for food and water due to crowded
 2453 enclosures. It was noted that some infant or juvenile individuals do not have their mother to
 2454 depend on for a food source, and Figure 5.3 shows an example of bottle feeding that is done to
 2455 supplement the mother's milk.

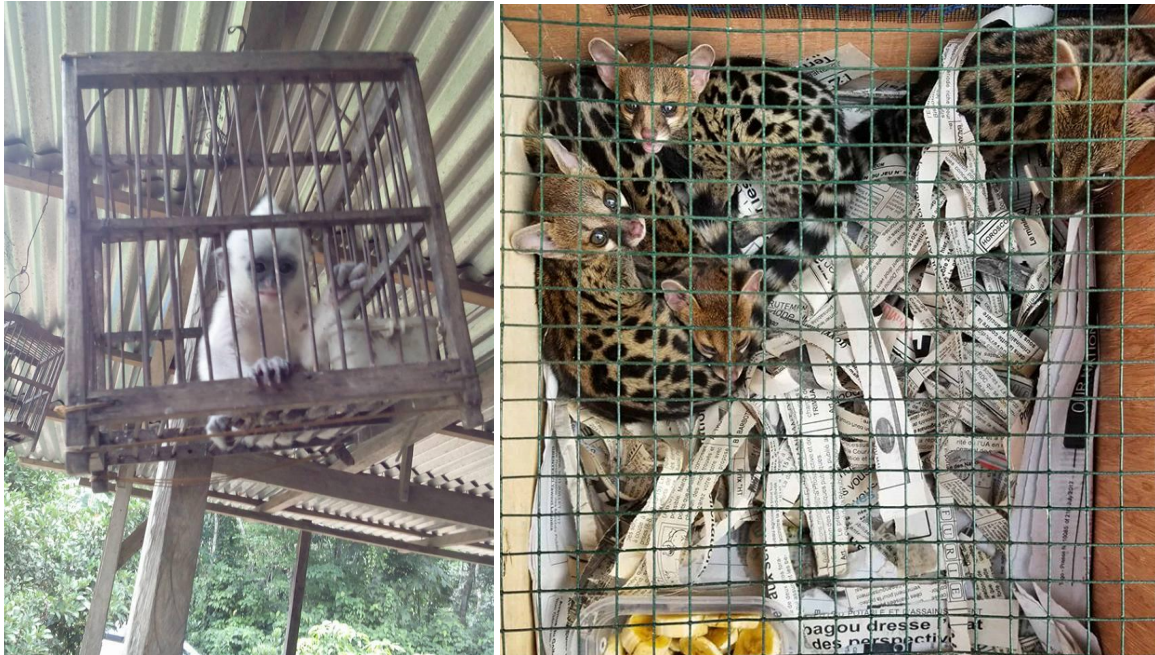
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Figure 5.3: This figure displays both Felidae species, Cheetah and Leopard Cat, taken from one Facebook profile and one Instagram profile, that show how milk is supplemented when young are taken from their mothers in the online wildlife trade.

5.3.2. Freedom from Discomfort

The highest violation of this freedom comes from the enclosure but also from human-animal interaction, inter-species interaction, and other circumstances. Two examples of enclosure circumstances can be seen in Figure 5.3. Along with violating other freedoms, this example shows a primate with barely enough room to turn around- hung up high above the people while the enclosure is constantly moving.



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2470 Figure 5.3: This figure displays two circumstances taken from a Facebook profile where

2471 individuals from the orders Carnivora and Primates are met with small, crowded, and

2472 uncomfortable conditions in the OWT.

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2474 As discussed in the introduction, human-wildlife interaction poses dangers to wildlife and

2475 humans. Figure 5.4 displays two instances that show a type of human-wildlife interaction in the

2476 OWT.

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Figure 5.4: This figure represents some of the human-animal interaction that was seen using macaques. In both instances, individuals are being held by the chest by a human and held up for the camera with potential bright lights and noise involved.

5.3.3. Freedom from Pain, Injury or Disease

Freedom from Pain, Injury, or Disease is an important freedom that is heavily violated in the OWT. Albino individuals were supplied by 108 profiles and examples can be seen in Figure 5.6. There was a clear demand for albino individuals, and it seems these individuals are seen as a rarity in the community. Albinism is a genetic disorder that can be caused by uncontrollable breeding- a likely cause in this circumstance (Dharmarathne & Wijesinghe, 2020; Leroux et al., 2022).



Figure 5.6: Photographs gathered from two Facebook pages display an albino owl and an albino wallaby that are involved in the online wildlife trade.

There were 27 instances of obesity in animals that clearly were not properly fed and now suffer with this disease. An example can be seen in Figure 5.7. It should be noted that all 27 individuals that were clearly obese were also some species of civet.

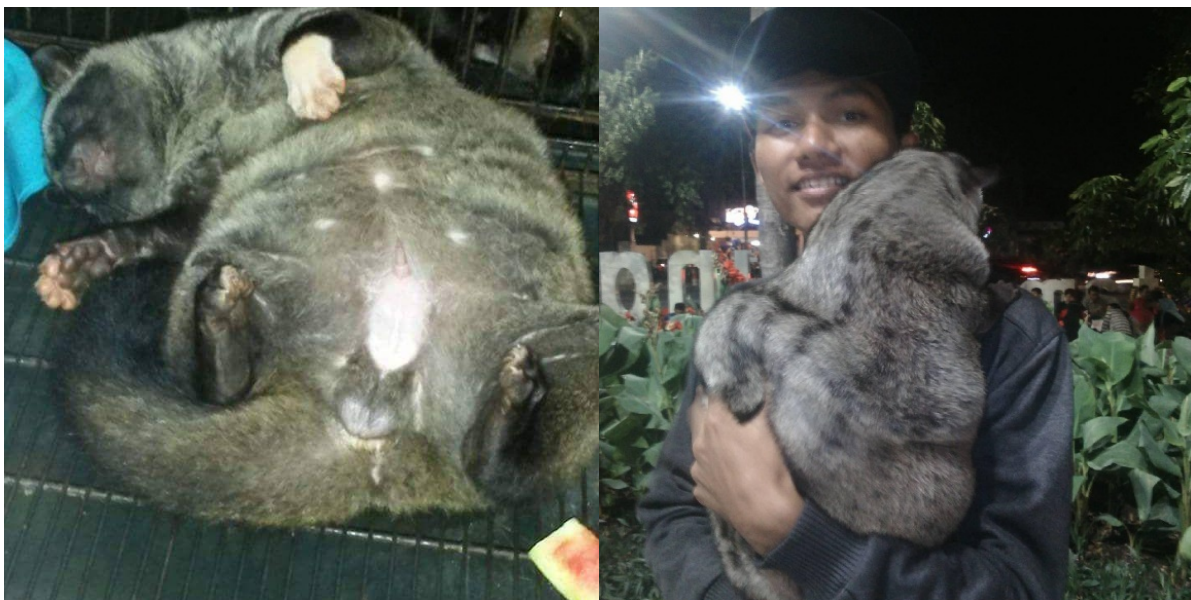


Figure 5.7: This figure, taken from an Instagram profile, shows a civet so obese it can barely sit up- a serious health concern any veterinarian would be alarmed by.

Another issue was that some enclosures were so badly maintained, it poses a risk to the individual's safety and well-being. An example can be seen in Figure 5.9.



Figure 5.9: This figure, taken from a Facebook profile, shows an adult sun bear in an enclosure that poses extreme risk to the safety of the individual being held there.

5.3.4. Freedom to Express Normal Behavior

There were many violations of Freedom to Express Normal Behavior under enclosure, enrichment, socialization, and other. Most individuals were unable to express normal behavior because of enclosures. The most common type of housing was small, metal, varying-colored cages that provided a small area to move around in. An example can be seen in Figure 5.10. Housing was even more limiting for transportation purposes, barely allowing any room to move, and an example can be seen in Figure 5.11.



Figure 5.10: This figure represents two photographs taken from two different Instagram accounts that show the most common housing found in this study represented by different species of civets.



Figure 5.11: This figure represents the housing used when transporting wildlife in the OWT. These types of enclosures are damaging to individual welfare, and the longer the transport is, the larger the impact may be to individuals.

5.3.5. Freedom from Fear and Distress

The last freedom, Freedom from Fear and Distress, was harder to monitor, and this involves instances of a higher population, facial expressions, the presence of a hiding place, and instances of vocalizations. Violation of this freedom was mostly monitored by the facial expressions of individuals being sold. An example can be seen in Figure 5.2.



Figure 5.2: This figure displays photographs taken from one Instagram profile (left) and one Facebook profile (right) that displays two tarsier (left) and two civets (right) that are displaying fear and distress through their facial expressions.

5.4. Discussion

This chapter proves that the welfare of wildlife in the OWT is poor with 39% of the media data violating the Five Freedoms (Maekivi, 2018; Wyatt et al., 2021). Photographic evidence shows that these animals are being kept in unfair conditions, pushed to behave in unnatural ways, and lack physical and emotional consideration (Bergin & Nijman, 2019 (2)). With the large number of individuals involved in the OWT in Indonesia, this is a serious problem that needs to be addressed (Nijman et al., 2019 (1); Nijman et al., 2021; Nijman et al., 2022 (2)). Studies reveal that most welfare impacts go unreported, and this is especially true in the IWT where there is a denial or ignorance of the welfare conditions wildlife face in the trade (Baker et al., 2013; Wyatt et al., 2022).

2551 Feeding and nutrition is a complex area for animals in captivity (Hosey et al., 2013), and 34% of
2552 violations involved the Freedom from Hunger and Thirst (Hosey et al., 2013). The availability of
2553 food was the biggest violation and although animals should have available food sources, most
2554 media didn't show availability (Hosey et al., 2013). Another clear problem was overcrowding of
2555 individual's enclosures, likely leading to increased competition for food and nutrients, and
2556 therefore negatively impacting individual welfare (Hosey et al., 2013)

2557

2558 Additionally, 33% of the violations (n=3,401) were related to the Freedom to Express Normal
2559 Behavior which is normally met with enrichment activities and detailed enclosures. A general
2560 lack of enrichment and/or presence of small enclosures that did not provide a hiding place for
2561 individuals to use were seen (Hosey et al., 2013). Enclosures were one of the biggest violations
2562 for several of the freedoms and tended to be small, unsafe, and limited the ability to express
2563 normal behavior (Hosey et al., 2013).

2564

2565 Results also indicate poor health in some of the individuals traded, revealing 27 instances of
2566 obesity primarily among civet populations, and nocturnal species were exposed to daylight
2567 which could damage their eyes or other bodily parts (Fuller et al., 2017). Additionally, although
2568 albinism isn't something that can be prevented, the high level of it suggested unregulated
2569 breeding was occurring which was also supported by over 10,000 photographs and videos
2570 (Feddema et al., 2020; Sung & Fong, 2018).

2571

2572 Finally, individual behavior was affected, and there was a general lack of enrichment in
2573 enclosures and facial expressions and vocalizations indicated distress (Hosey et al., 2013). Not
2574 enough socialization or too much socialization was also indicated, and individuals were exposed
2575 to human-animal interactions or inter-species interactions that go against their natural
2576 behavior (Hosey et al., 2013). Overall, the welfare of individuals in the OWT was poor when
2577 using the Five Freedoms for evaluation (Bergin & Nijman, 2019 (2); Hosey et al., 2013). Finding a
2578 way to work with, rather than against, wildlife traders may create a way to implement better

welfare conditions, and more studies on welfare in the wildlife trade need to be conducted (Baker et al., 2013; Bergin & Nijman, 2019 (2); Fuller et al., 2018; Wyatt et al., 2022).

5.5. Conclusion

Future initiatives investigating the OWT should use the user-generated content to further investigate welfare conditions in the OWT. Methods or guides to improve the welfare conditions of wildlife involved in the OWT would be beneficial in identifying and researching wildlife. Overall, better welfare conditions for wildlife might mean working with the actors in the OWT to decrease the overall trade, and also provide good welfare conditions for wildlife that is traded (Bergin & Nijman, 2019; Wyatt et al., 2022). When focusing on a mutual desire to achieve wildlife prosperity, these relationships would be beneficial and may result in better welfare conditions for wildlife in the OWT.

Chapter 6: Final discussion

6.1. Introduction

The OWT has become a major marketplace for the wildlife trade, and many actors are switching or joining from physical marketplaces to online ones (Di Minin et al., 2019; Sung & Fong, 2018; Thomas et al., 2021). Actors in the OWT include sellers, buyers, suppliers, collectors, resellers, and other middlemen that have created a new system of wildlife trade that is harder to detect, and it is less likely to be caught by enforcement agencies (Costa et al., 2021; Lavorgna, 2014; Phelps et al., 2016). This study investigates the OWT from different angles including from a trade chain perspective, a species analysis, a geographical context, social media and marketing dynamics, and welfare violations. This work is essential to understanding the OWT, and ideally lead to a reduction of wildlife presence and actor participation in the OWT system. As populations of wildlife decline, and the wildlife trade grows on both online platforms and in physical marketplaces, it is important to understand so strategies can be implemented to stop the OWT.

This study identified 70,508 social media posts on Instagram and Facebook that are linked to the OWT in Indonesia, and 40% of them were deemed relevant to the study- published by the 264 unique sellers operating 386 social media profiles. Using keywords, it was with relative ease that the posts were found, and it highlights the vastness of this OWT network (Xu et al., 2019; Xu et al., 2020). The OWT on Instagram and Facebook in Indonesia is extensive. Once a network is found, researchers can learn the dynamics of the OWT and use the information in conservation efforts.

2637 Table 6.1: This table breaks down the key findings found in this thesis by subject.

topic	key finding(s)
Legality	• 34 species that accounted for 40.5% of the trade are legally protected
Species	• 22.4% of the OWT was in threatened species • Non-threatened species were traded more frequently and in higher numbers
Geography	• 93.7% of the trade was in species local to Indonesia • 69% of the sellers are located in Java • Local species were traded in higher numbers than international species • The international trade was linked to Africa, South America, and other Asian countries
Supply Groups	• 38.6% of sellers were linked to supply groups (SG) • SG accounted for 63.4% of the trade found • SG accounted for 69.5% of the trade in threatened species • SG accounted for 82.7% of the international trade seen
Effectiveness of social media platforms	• 15% of profiles were removed from the social media platforms • 92.7% of deleted profiles sold threatened species
Marketing	• Business branded profiles had higher engagement rates and a higher profile reach
Welfare	• 39% of media data violated the Five Freedoms of animal welfare

2638

2639 6.2. Profile metrics

2640 Although the average profile reach is in the thousands (2506 followers/friends), and the
2641 average trade size is 47 individuals, 75% of profiles had less than 40 followers or friends and
2642 63% of profiles traded less than 40 individuals (n=386). Profiles stood out if they had a higher
2643 profile reach or trade size, and only a few key sellers had more than 10,000 followers or friends
2644 or traded more than 500 individuals. Since most sellers do not stand out when it comes to
2645 profile metrics, it is suggested that certain actors are more involved in the OWT community
2646 than others (Avis, 2017; Latinne et al., 2020). This could reflect the growth of the network due
2647 to the online aspect of the OWT, allowing for even smaller or less impactful sellers to
2648 participate. Furthering this, most sellers only run one social media profile, and the few that run
2649 multiple most likely fall under the larger profile reach and trade size category discussed above.
2650 The positive correlation between profile reach and trade size concludes this point and reveals
2651 that sellers are becoming significant in the OWT through their social media profiles.

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6.3. Trade chain

Most of the actors in this study referred to themselves as a seller (43.3% of posts) (n=28203), and this suggests that sellers run the OWT like a business. A portion of sellers did refer to a boss (23.7%), and it is most likely that this refers to a supplier who is also in the OWT or working in the physical marketplace. Hunters and captive breeding are two other sources mentioned in the trade chain and it is likely that both are occurring even simultaneously. Terminology used and information shared reveal transparency in the OWT network. This lacks information on prices or mechanics which seemed to happen in private settings using alternate SNSs. With that, when information was lacking, sellers directed buyers elsewhere like to WhatsApp, direct messages, or an additional social media profile. Investigating the trade chain also suggests that sellers are aware of the potential repercussions of being involved in the OWT, and it was common for them to say no COD, no PCB, or reference Rekber. In addition to this, some profiles (23.7%) reference legality, safety, and trust and perform higher regarding engagement rates. The use of these terms further the claim that actors are aware of the consequences. As a response, sellers posted testimonials that showed a successful trade deal to attract more buyers to trust and work with them. Methods were revealed in detail on posts or in biographies, and sometimes media revealed methods without a written explanation. For example, in this specific OWT network in Indonesia, motorbikes or taxis were portrayed in photographs and videos as the most common transportation method. Overall, the more transparent, organized, and business-like the sellers were in the trade chain, the higher overall engagement rates and success of the OWT network.

6.4. Species

All the focal orders (Carnivora, Dermoptera, Diprotodontia, Pholidota, and Primates) were chosen because of reports to their presence in the OWT and the threat of extinction placed on these species from the wildlife trade. This study revealed these species were present in the OWT data collected for wildlife species. It can be argued that with the 104 species and 16,392 individuals found for sale, the OWT in Indonesia is vast and an obvious threat to its wildlife species. Overall, 40.5% of the trade found is illegal under Indonesian law and stresses that

protected species are still being traded and specifically online. Most of the trade was in non-threatened species (61.2%) emphasizing not only a demand for these species but an ability to acquire them. The trade of protected species (38.8%) suggests that despite demand, available populations are lower than non-threatened species (n=16,392). The top ten species traded in this study make up 79% of the trade found and these species can be seen in Table 6.2. All the species are labeled 'local' because they are native to Indonesia and legality indicates whether the species are protected under Indonesian law, but this does not necessarily mean the trade is legal or illegal.

Table 6.2: This table illustrates the data collected for the top 10 species found to be traded in this study.

Species	# Individuals	IUCN Red List	Trade type	Legality Y/N
Common Palm Civet	4431	LC	local	N
Otter	2525	NT	local	Y
Leopard Cat	1349	LC	local	Y
Small Indian Civet	1105	LC	local	N
Common Long-tailed Macaque	916	EN	local	N
Masked Palm Civet	806	LC	local	N
Binturong	548	VU	local	Y
Javan Surili	473	VU	local	Y
Small-toothed Palm Civet	436	LC	local	N
Javan Ferret Badger	396	LC	local	N

Media data and caption data did not always align for species traded. Albino individuals are clearly demanded, mentioned in 16.6% of posts (n=38,083) and specially traded by all Supply Groups (SG). This likely is due to their special morphological form (Akmal et al., 2022; Fedemma et al., 2020; Nekaris & Nijman, 2018; Sung & Fong, 2018).

6.5. Geographical context

Tagging a geographic location on social media posts resulted in higher engagement rates overall which emphasizes the concept that buyers respect transparency and knowing this information

is an important factor in participating and engaging with the OWT. The majority of the trade seen was a local trade of native Indonesian species, and this represents a large OWT network present in Indonesia with higher trade sizes due to easier access. Across Indonesia, the trade spanned through 81 cities although 69% of the sellers were located on the island of Java. This increased this area's importance which is highlighted in the literature (Gomez et al., 2019; Gunawan et al., 2017; Nijman et al., 2021; Thomas et al., 2021). The international trade was minimal (6.3%) and suggests that most of the OWT network has little international connections and it is presented that the sellers trading international species overlap with the key influencers in the network. Of the international connections, that were present, linked geographic areas include Africa, other Asian countries, and South America which is also supported in the literature (Figure 6.1).



Figure 6.1. This simple pie chart illustrates the areas that the international trade found in this study is linked to based on home range data.

6.6. Supply Groups (SG)

Supply Groups (SG's) formed around dozens of key nodes cushioned by binary or singular nodes that include 38.6% of the sellers analyzed in this study. Most of the actors involved represent singular nodes (54) that have at least one connection to the OWT but are less likely to be

orchestrating matters. The binary nodes (29) and especially the key nodes (17) have a stronger hold on the OWT. By posting the same individuals for sale within the same general time period, and stressing the idea of a boss, SG's collaborated due to a common supplier, increasing the likelihood of a successful trade deal for that supplier. Over a hundred of these instances occurred, and could involve up to eight sellers, revealing an organized network that uses social media to bolster wildlife trade efforts. These results suggest that SG's offer new opportunities or perks for actors which can include international connections and the ability to acquire threatened species to trade.

6.7. Social media platform effectiveness

The focal social media platforms, Instagram, and Facebook, have both put forth efforts to reduce the wildlife trade on their platforms by creating a 'report' option for viewers, and this study reveals that the OWT is still prevalent (Krishnasamy & Stoner, 2016; Nijman et al., 2021; Sardari et al., 2022; Xu et al., 2020). There were 60 profiles deleted from Facebook and Instagram throughout this study which accounts for 15% of all profiles analyzed. It is likely the profiles were removed by the platform for violating the rules and guidelines regarding animal abuse and welfare. Sellers emphasized trust and safety in 23.7% of the posts and subsequently received higher engagement rates because of it. This suggests that both sellers and buyers are aware that the OWT is not allowed by social media platforms, or it is illegal in Indonesia. This study also found 20 hashtags that were flagged for 'animal abuse' violations among the millions that were tagged by actors in the OWT (Eltagouri, 2017). Although this data reveals a step in the right direction, Instagram and Facebook must continue to remove trade related imagery and text from their platforms and increase their efforts as the OWT increases itself (Eltagouri, 2017; Feddema, 2022). Social media platforms should consider establishing a system that monitors, reports, and removes OWT posts or profiles rather than depending on social media users to alert them to it (Montrose et al., 2021). Many people involved in these OWT networks intentionally hide themselves from outsiders. Depending on the persons involvement, most violations go unreported because of their desire to be involved. As the OWT networks expand, more people are becoming involved which should increase reporting efforts. However, if a

person would rather be involved in the network, it will continue to expand without repercussions (Hughes et al., 2023; Moreto & Van Uhm, 2021; Stringham et al., 2021).

6.8. Marketing

This study found that marketing techniques are being used in the OWT, and a deeper analysis reveals trends within the strategy. Business branded profiles had a higher average profile reach (3184 individuals) as well as higher engagement rates (+302 likes; +10 comments). These profiles also used specific terminology to communicate with buyers, showing words like 'stock', 'sold out', 'cheap', 'smart buyer', 'Rekber', 'no COD', and 'no PCB'. This terminology is mostly used by business branded profiles, and the data further shows that this type of branding is the most effective branding technique. Although rebranding is a less common marketing strategy, co-branding within the network seems to be effective. Content marketing revealed higher engagement rates on posts with more trade related information such as location and suggests that buyers are influenced by open transparency within a trade deal. Product marketing revealed marketing initiatives focused on Orders other than Mammalian species and highlights opportunities for research into different focal species. Although, the focal species were marketed using product marketing strategies, and hashtags revealed a demand in mammalian species. This information would be useful in a conservation marketing campaign as seen in the published literature on the subject (Duthie et al., 2017; Wright et al., 2015). Overall, the investigation into marketing in the OWT should be considered and furthered in the future.

6.8.1. Welfare

The investigation into welfare in the OWT reveals welfare violations when using the Five Freedoms as a basis for scoring and evaluating captive conditions (Bergin & Nijman, 2019 (2); Hosey et al., 2013). It was found that 39% of the media evaluated displayed some type of welfare violation. The enclosures displayed in the media were the most noted and showed enclosures that were considered dangerous, limiting to natural behavior, or generally too small. Obvious health violations were limited to specific species and competition for food and water was the most obvious violation of the Freedom for Hunger and Thirst. In general, the other

violations effected an individual's Freedom to Express Normal Behavior, and sellers seem to lack an education into the behavior of the species traded or are simply not interested in maintaining normal behavior conditions. Despite this, one of the best ways for welfare conditions in the OWT to get better is to provide this education and knowledge to sellers while conservationists work to end the OWT all together.

6.9. Conclusion

The OWT on Instagram and Facebook in Indonesia is alive and thriving. Understanding the information presented in this thesis about the dynamics of the OWT is key to achieving the overall goal of stopping the OWT. Facebook and Instagram serve as good platforms rich with an OWT presence that is already trying to be removed by the platforms. Future initiatives should work on gathering data that furthers our knowledge of the trade chain through the eyes of an OWT actor, study social media marketing and the effect it has had on the OWT so that it is considered and attempt to work with or educate OWT actors about welfare and the implications it has in the OWT. I would like to further this research by studying a broader range of species, conducting a social network analysis based on social media followers or friends, and an evaluation of price data if listed in posts. In conclusion, although this work is a start, it needs to be furthered to achieve the goals of researchers and conservationists in stopping the OWT.

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