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RESEARCH PAPER

Understanding Strategic Environmental Management Response to the Sustainability Challenges: A Case of Electronic Waste Management

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ABSTRACT

Rapid technological advancements in the last decade brought modern environmental sustainability challenges with an urgent need to address a more environmentally friendly future. To achieve company objectives influenced by growing concerns for corporate social responsibility (CSR), environmental legislation, and stakeholder sustainability interests, businesses are addressing environmental policies at a strategic environmental level. Electronic waste is one of the most toxic and hazardous streams of the modern era, and efforts are being made to mitigate its environmental impact. Pakistan's inadequate e-waste management (EWM) regulations have serious environmental consequences and have propelled the country to the forefront of the sustainability debate. This exploratory study observed proactive, reactive and indifferent approaches adopted by organizations to manage e-waste in various service sectors. It was evident that Pakistani firms are aware of the effects of environmental degradation. Positive trends discovered in the study include green business practices and the implementation of environmentally sustainable policies.

KEYWORDS Business Strategies, Circular Economy, Electronic Waste Management, Environmental Policy, Organizational Approaches, Strategic Environmental Management, Sustainability

Introduction

The rise of sustainability concerns related to the environment, society, and economy can be attributed to the combined effects of globalization and technological advancements (Ali et al., 2019). Economic growth and technical advancement have increased the use of electrical and electronic devices with reduced lifespan and increasing electronic waste (e-waste)(Fajardo et al., 2020). The elimination of toxic substances in discarded equipment necessitates the utilization of specialized procedures in Electronic Waste Management (EWM) and disposal in order to safely reduce any negative effects on the environment (Khetriwal et al., 2005).

The inadequate management procedures have been revealed by the rapid increase in discarded electronic equipment, leading to detrimental environmental implications (Puckett et al., 2002). Li et al. (2020) and Kolev et al. (2021) investigated the implementation of circular economy principles in EWM involving recyclability in product design, implementing take-back procedures, and building efficient collection and recycling networks. Businesses, academia, and politicians are faced with the task of establishing systems that effectively handle end-of-life equipment in a way that is sustainable for the environment (Heeks et al., 2014).

In managing end-of-life equipment, governments, businesses and key stakeholders are not on the same page, though bulk consumers need to play a key role in

addressing e-waste. Many corporations in emerging economies struggle to achieve a balance between financial rewards and environmental considerations in the absence of well-defined and integrated sustainability plans (Ali et al., 2019). Organizations act only according to the knowledge they possess of the sustainability challenge, and its account is vital to meet this global problem (Abila & Kantola, 2023). Environmental Management System is a feasible approach for achieving organizational objectives and enhancing Corporate Social Responsibility (CSR) (Ikram et al., 2019). Firm's environmental strategies towards EWM can bring a lot of change (Siddiqi et al., 2020). This study aims at exploring organizational approaches and strategies for environment friendly EWM in the country. The main research is, how do the organizations approach EWM under SEM? A sub-question is to explore reasons behind adoption of different approaches towards organizational environmental management. Organizations face institutional pressures in decision making on sustainability in developing economies (Fatima et al, 2023). From a theoretical point of view, the study builds an integrative approach to address different perspectives in handling EWM as organizational environmental policy, and as a factor of strategic environmental management and business sustainability.

Literature review

Khetriwal (2005) defines e-waste as an electrically powered device that does not satisfy the customer's requirements but can be recycled into a different product. The category of electronic products discarded by their owners encompasses an extensive range of items, including home appliances, information technology and communication devices, and consumer electronics (Puckett et al., 2002). In 2019, the UN reported 50 million tons of e-waste worth $62.5 billion (Dhillon, 2020). E-waste hazards were found 20 years ago. Circular economy uses e-waste to restore natural or technological processes, thereby benefiting the environment, society, and economy (Ottoni et al., 2020). Numerous research studies have attempted to quantify the global quantity of e-waste. However, there is a dearth of comprehensive and reliable data on the issue (UNEP, 2009).

EWM Policy and Program

With the realization of inadequate waste management regulations and environmental standards, systematic waste management began in the 1990s guided by waste disposal regulations, enhancing environmental standards. The focus on social, political, structural and economical aspects, helped in initiating an integrated level of policy towards waste management (Wilson, 2007). These policies include improving product design, recycling, reuse, inventory management and life cycle solutions (Horne et al., 2006). The recycling pace has remained slow for countries in developing economies that have high adoption rate for e-technologies (Limbachiya et al., 2023). Environmental regulations comply with the "precautionary principle," "prevention is better than cure," and "polluter pays" (Nakajima et al., 2005). Along with eco-design, reuse, reduction, and recycling can reduce waste and enhance resource reusability and product life span (Mallawarachchi et al., 2012). Extended Producer Responsibility (EPR) is the main way manufacturers manage end-of-life products in industrialized countries, together with e-waste legal frameworks (Widmer et al., 2005).

Sustainable Business Approach

E-waste as a modern sustainability problem, the manufacturing, usage, and disposal of the electronics industry lacks sustainability and has significant environmental impact (Goosey,2009). Uncoordinated efforts by companies have no positive social impact, in creating competitiveness, redesigning of products, markets, and value chains (Porter et al., 2006). Therefore, sustainable practices and policies can meet current needs

and preserve environmental resources for future generations. In order to cultivate a sustainable business strategy, it is imperative for companies, stakeholders, and the wider society to place emphasis on economic, environmental, and social values within the company's operations and strategies (Ali et al., 2019).

EWM in Pakistan

Pakistan, is a leading recipient of e-waste, despite being Basel Convention signatories, which restricts import of used materials and requires product integrity. Environmental Protection Act 1997 also prevents toxic-waste discharge (Iqbal et al., 2015). In 2015 the country had 317,000 metric tons of domestic and imported electronic waste (Ali et al., 2019). Iron, aluminum, gold, and other metals make up more than 60% of e-waste, attracting numerous entrepreneurs for up to 300% profit rate (Widmer et al., 2005). Illegal trade, negligible incentives for recycling, non-binding industrial laws on end-of-life products, lack of awareness programs by municipalities, inefficient and poor monitoring systems are factors that aggravate the environmental problem (Shahkhan et al., 2017). The growing influx of e-waste and little or no interest of legislators and environmental agencies makes it a growing problem requiring immediate redress (Rasheed et al., 2022).

Strategic Environmental Management

Environmental management includes regular operations, short-term plans, and long-term goals that follow environmental policies and practices to balance economic, social, and environmental benefits (Montabon et al., 2007). Strategic environmental management relates to a company's environmental preference incorporated at policy level as exhibited in making business choices (Douglas et al., 1995). Government regulations and customer expectations influence an organization's environmental policy (Preuss et al., 2009). Internal factors such as financial considerations, leadership, and organizational culture also play a role (Fernandez et al., 2003). Peer pressure and reputation are taken inter-sectoral pressures (Miles et al., 2000).

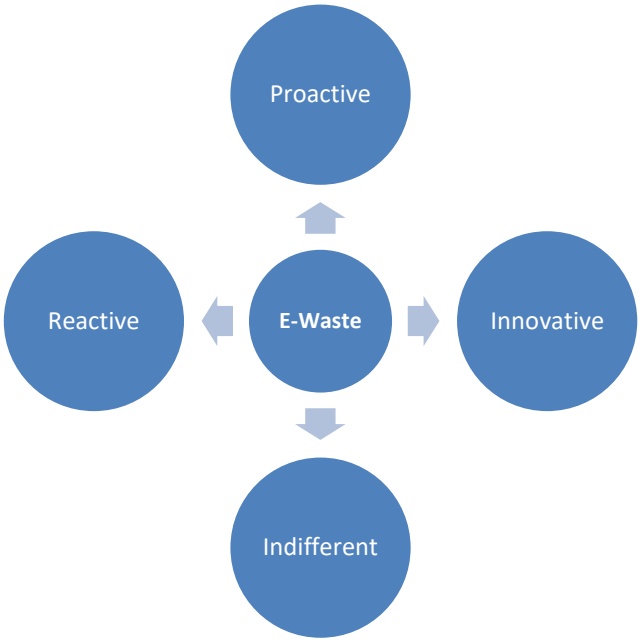

Figure 1. Strategic Model of Electronic Waste Management Source : Heeks et al., (2014) adapted from Ghobadian et al., (1995)

The generic strategic approaches (Heeks et al., 2014), presents indifferent organizations with no strategic interest in EWM; reactive, that yield to contextual

pressure and implement minimum strategies; proactive firms, act responsibly to meet simplistic requirements; and innovative firms that use e-waste as a motivation for suggesting creative solutions.

Theoretical lens of environmental integration in the organization

Researchers have viewed this issue with the lens of institutional, stakeholders and resource dependency theories.

Resource-based view originated from Penrose's (1959) business growth theory, asserts that a company's growth is contingent upon its ability to effectively utilize its physical resources. Hart (1995) incorporated environmental sustainability to strategy and anticipated innovative policies in boosting the company's competitiveness. To improve competitiveness, studies have focused on optimizing resource use, but they have mostly ignored the potential environmental consequences of economic activities.

Freeman's (1984) *stakeholder theory* proposed a strategic approach to business management with an integrated view of corporate environmental responsiveness, suggesting satisfaction of non-financial stakeholders crucial for a company's success. This theory emphasizes a strong company-environment relationship. Buysse and Verbe (2003) used this perspective to identify environmentally proactive companies that were more inclusive of their stakeholders.

Institutional theory is rooted in a symbolic interpretive perspective, which tries to clarify the dynamics and interactions of persons and groups within an organizational context (Selznick, 1957). Evidence from emerging economies has shown significance of institutional factors for operational environmental initiatives (Esfahbodi et al., 2016). It determines economic, social, cultural, and political contingencies that aid to compete with established environmental standards (Yang et al., 2019). Therefore, this theory gives a holistic view of a firm's environmental management by going beyond factors of competitive advantage.

Conceptual Model

This research aims to contribute to a deeper comprehension of the interrelated components associated with environmental management within the realm of e-waste. The following model was created in order to achieve the goals of this study.

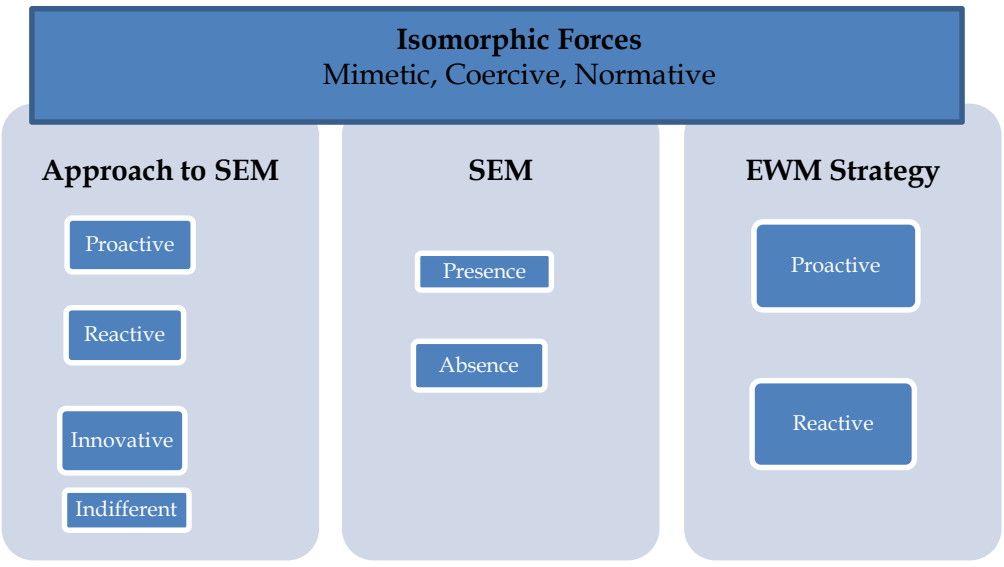

Figure 2: Conceptual Model

This model illustrates the fundamental elements derived from the existing literature on EWM strategy. The environmental management of organizations encompasses four distinct activities and approaches in addressing environmental challenges, ultimately shaping the organizational SEM in response to institutional variables. The incorporation of strategic environmental management (SEM) inside businesses facilitates the adoption of EWM strategies.

Material and Methods

EWM has emerged as a sustainability problem in the backdrop of digitization, the world over. Studies on e-waste in a local context are restricted to material fluxes, quantity, data gaps, environmental effects, health concerns, and management challenges resulting from informal recycling (Iqbal et al., 2015). An exploratory research design was used to study this complex and unexplored phenomenon using semi-structured interviews according to guides for data collection.

The researchers employed interview-based qualitative research methodology due to its enhanced adaptability and flexibility in capturing a wide range of perspectives from participants. Organizational environmental management is still not widely practiced in Pakistan, therefore snowballing technique was used to identify relevant participants. Preference was given to managers with knowledge of organizational strategies and environmental management experience. For appropriate information annual reports with CSR and sustainability content, newspaper articles, company's websites, reports published by NGOs working on issues of waste management were searched. The interviews with stakeholders covered diverse views which helped in triangulation of this study (Yin, 2009).

Sampling

Organizations with bulk consumption of electronic products generating high volumes of end-of-life equipment were taken as target population and were purposely divided into four service sector categories. The semi-structured interviews were conducted from software, internet service providers (ISP), education and telecommunication sectors comprising 11 bulk consumer organizations of e-waste. For generating a better understanding of the phenomenon, one interview each was conducted from five categories of other stakeholders including e-waste recycler, vendor, maintenance sector, waste management company and regulator. Based on the number of employees, data was collected from the large and medium sized organizations, as e-waste is an end user waste and its volume depends on the size of the firm. In this research large scale firms had over 250 employees while medium and small-scale firms had up to 50 employees.

Ethical Considerations and Rigour

This research adhered to fundamental ethical principles. Participants granted consent and interviews were conducted according to Kvale and Brinkmann (2009) ethical issues in qualitative research. For ensuring data reliability and validity the repetition in study results were identified (Pole and Lampard, 2002) alongside enhanced validation while interviewing a wide variety of stakeholders for triangulation. This approach facilitated the attainment and assessment of the study's validity and reliability.

Data Analysis

The interview analysis approach proposed by Miles and Huberman (1994) was employed, following the three steps of data reduction, presentation, and conclusion. After the transcribing process, each interview underwent systematic case analysis through coding. In order to mitigate any ambiguity, the decision was made to employ the Computer Assisted Data Analysis Software Package (CAQADS) as a means of enhancing the overall effectiveness and efficiency of the data analysis process. The data was subjected to analysis using NVivo 11 software, in order to facilitate the examination of textual content and the process of coding transcripts. The process of open coding involves the systematic inspection of transcripts, wherein patterns and categories are identified through a meticulous line-by-line analysis. The process of selective coding used to identify the most salient thematic linkages between categories and subcategories, ultimately leading to the recognition of a wider framework (Braun & Clarke, 2006). These patterns help identify SEM and handling of e-waste.

Thematic analysis on organizational environmental management

Using thematic analysis on organization's environmental management drew out themes or patterns of relevant main data which helped the researchers to make statements about the topic for developing better understanding. The main differences in organizational practices towards environmental management are caused by the environmental regulations, sustainable initiatives and SEM.

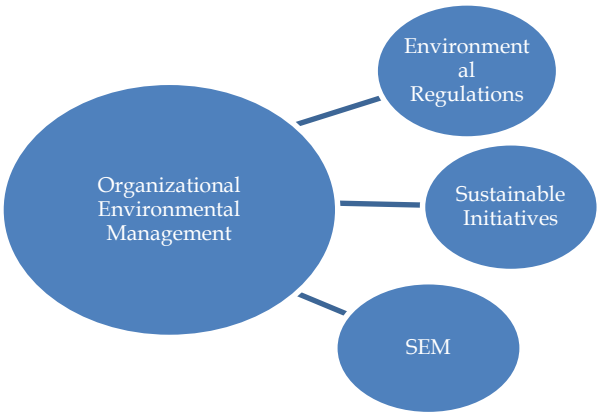

Figure 3: Thematic Analysis on Organizational Environmental Management

Environmental Regulations

The compliance with the Environmental Management System (EMS), and regulations are linked with SEM. The analysis shows that environmental regulations are being practiced in three large scale organizations through ISO 14000 series certifications and separate EMS. During the interview, a respondent highlighted the adherence to environmental standards as

The primary institutional force exerted on companies was the influence of government in shaping organizational approaches to environmental management. The voluntary adoption of environmental practices is not observed in organizations in Pakistan, mostly as a result of their profit-oriented attitude. Private enterprises are designed with the primary objective of generating profits, whereas the pursuit of environmental sustainability sometimes incurs significant costs. Hence, in the event that there is a specification necessitating the presence of an EMS supported by stringent legal frameworks, organizations are obligated to take action. An interviewee stated

> It is only the government which can force organizations regarding environmental issues by creating standards which must be followed everywhere according to their type of industry. [**Respondent. 5**]

The Pakistan Telecom Authority (PTA) provides a clear environmental framework for telecom and ISP companies. International companies and subsidiaries used an innovative approach to environmental management. Due to budgetary limits, limited societal influences, concentration on profitability, and lack of desire for good image building on sustainable efforts, medium-sized businesses lacked environmental management strategies.

Sustainable Environmental Initiatives

The management of the environment is met with a variety of responses from different organizations, including health and safety precautions, environmentally friendly methods for the reduction of carbon footprints, and planting drives for environmental conservation and protection. According to the findings, all large-scale firms were well aware of their carbon footprints and were working to reduce it. In Pakistan, green practices and the adoption of environmental initiatives by big companies is a beneficial tendency, and the government is eager to encourage large firms to adopt such an approach. The statement was made by one of the government officials as

> Opportunities for green business practices, environmentally certified products and energy services and conservation companies would be promoted in the upcoming environmental policy. [**Respondent.15**]

The extent at which organizations undertake sustainability and environmental efforts is determined by the organizations themselves. Thus, all large firms took an active stance on green practices and environmental sustainability in the workplace.

Strategic Environmental Management

Strategic Environmental Management (SEM) and Corporate Social Responsibility (CSR) have garnered considerable interest within the realm of business and sustainability due to their interrelated nature. SEM entails the incorporation of environmental factors into an organization's overarching strategic framework, whereas CSR encompasses an organization's obligations towards both society and the environment. The organizations in this study highlighted the SEM linkage with the overall sustainability perspective since businesses' awareness of their position in society, related to their CSR perception, governs their environmental response.

Incorporating the management of ecologically sustainable growth and consumption processes into a company's strategic management and planning phase is an implicit acceptance of the company's obligation toward the various stakeholders in the company's operations. The findings of this study demonstrated a lack of SEM and revealed that certain matters were glossed over in the operations CSR, sustainability, and health and safety management sections. The presence of SEM is outlined in Table 1, which follows, across a number of sectors.

Table 1
Organizational Approach towards SEM

No.	Sector	SEM	Organizational Approach

1	**Software Services** Large scale	✓	Proactive
	Software Services SME	✗	Indifferent
2	**Telecommunication** Large scale	✓	Proactive
3	**Internet Service Providers** SME	✓	Reactive
4	**Education Sector** Large scale	✗	Indifferent
	Education Sector SME	✗	Indifferent

Thematic Analysis on EWM

This section presents the thematic analysis of the organizational strategies for e-waste and focuses on differences among organizational approaches in the context of SEM and EWM.

EWM Strategies

Companies provided differing responses regarding the management of obsolete equipment. Most public entities auction end-of-life equipment annually. SMEs contact scrap dealers and vendors for final disposal, while private and large enterprises use vendors for non-functional electronics. Except for three large companies, all organizations lacked EWM. As businesses generate large amounts of waste, participants recognized the importance of EWM. E-waste is typically given to scrap dealers, recyclers, and non-governmental organizations (NGOs) as part of CSR initiatives for reuse. An interviewee representing an Internet Service Provider (ISP) expressed

> If possible, we try to give electronics another life by having them repaired or reused. When that's not an option, we dispose of them by soliciting bids from vendors. [**Respondent. 11**]

Small and medium enterprises being cost sensitive, prefer up-gradation over replacements. These products are anticipated to yield significant market value despite their lower production volume. In the absence of registered vendors or formal recyclers a firm's non-friendly approach towards the EWM system was clearly evident.

Organizational role and initiatives towards e-waste

Developing countries are significantly behind in implementing environmental initiatives although all businesses agree on the issue's importance and need for real solutions (Mallawarachchi et al, 2012). Businesses in Pakistan are likewise in the beginning stages of developing environmental management plans and systems. Many efforts are being made by businesses to lessen the impact of their operations on the environment caused by carbon emissions. Companies are accountable for their own internal EWM systems; nevertheless, there are very few businesses that are specialized in the management of e-waste and have fully operational units and resources at their disposal.

Large firms value EWM and take various initiatives under CSR, like donations and charity to under-privileged educational institutes and non-profit

organizations for reuse or recycling of equipment. Large businesses are actively endorsing a range of environmentally conscious initiatives, such as implementing energy conservation measures, adopting solar panel technology, and conducting nationwide awareness campaigns on imperiled ecosystems. In addition, certain companies engage in the dissemination of information through social media platforms to educate the general public on matters pertaining to litter and trash management. These firms also promote the principles of reuse, reduction, and recycling to foster awareness and understanding among individuals.

Organizational approach towards EWM

Dhillon (2020) highlights the presence of inter and intra-sectoral variations in firm's response to environmental concerns, as they develop diverse strategic approaches. Similarly, the management of electronic waste exhibits a similar pattern. Steger (1993) provided approaches adopted by firms in response to environmental challenges and opportunities. These strategies encompass a spectrum of attitudes, including apathy, defensive, offensive, and innovative strategies. The organizational environmental policy is often established as a spectrum ranging from proactive to reactive strategies, which are influenced by a variety of internal and external factors. The findings of the study at hand also establish proactive, reactive and indifferent approaches adopted by organizations towards EWM.

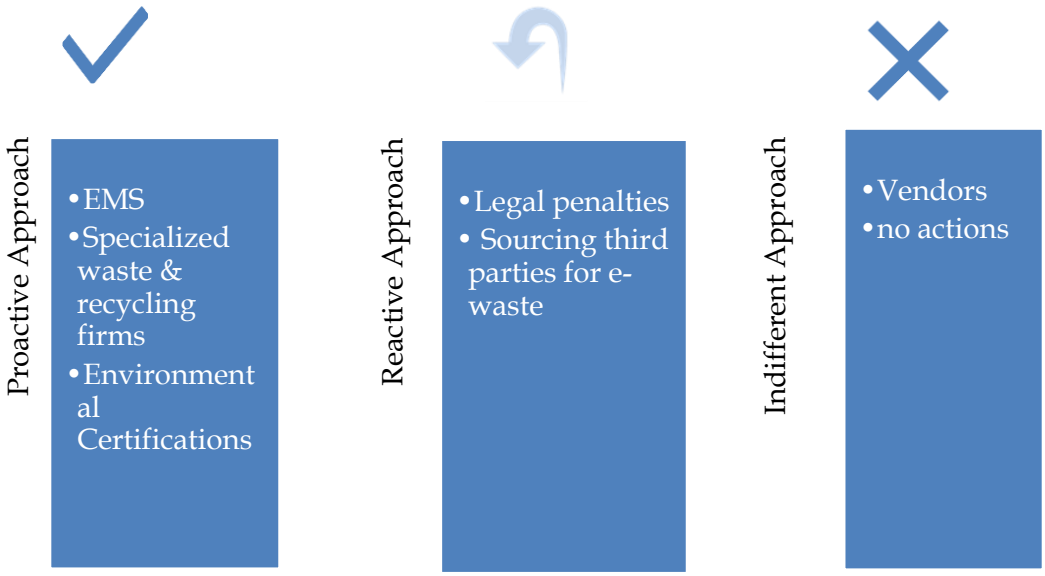

Figure 4: Organizational Approaches for EWM

Proactive approach

The proactive approach towards EWM was primarily observed in large firms that have a high volume of electronic product consumption. The implementation of EMS and EWM was present in three large private firms, despite the absence of any regulatory obligation. These companies competed with worldwide telecommunications and software companies with environmental certifications from Pakistan. Businesses, society, and governments monitor international organizations. Failure to prioritize environmental management may negatively impact their reputation. Hence, large companies had registered recyclers and firms to deal internal e-waste without regulations. They regularly recheck the status of e-waste provided to an approved vendor. Despite lacking EMS, only one public took a proactive approach by having pre-

registered vendors and categorized abandoned equipment. Moreover, the association between environmental proactivity and business size was also a significant finding in this study.

Reactive Approach

In reactive approach, businesses minimize their carbon footprint in response to present or anticipated regulations, aiming to prevent legal penalties for neglecting environmental management. Large and medium private firms, exhibited a reactive approach in managing e-waste. According to the interviewees, firms in Pakistan typically address environmental concerns solely in response to legal requirements. Consequently, businesses adopt a reactive strategy whereby they reduce their environmental considerations to the lowest standard in order to ensure regulatory compliance and reap financial rewards. Based on the results of this research, the vast majority of PTA-regulated businesses and ISO-accredited organizations use a reactive strategy to deal with their e-waste.

Indifferent Approach

The majority of small and medium-sized bulk users exhibited an indifferent attitude towards EWM due to constraints related to their limited size, client requirements, and financial standing. The Table2 given below shows the variation in responses by company's financial situation. EWM strategies are driven by business size and nature.

Table 2
Organizational Approach to Strategic Environmental Management

No.	Nature of business	Organizational Approach to SEM	EWM Strategy
1	**Software Services** Large	Proactive	Specialized waste & recycling firms
	SME	Indifferent	Vendors
2.	**Telecommunication** Large	Proactive	Specialized waste & recycling firms
3	**Internet Service Provider** SME	Reactive	Third party
4	**Education Sector** Large	Indifferent	Auction
	SME	Indifferent	Vendors
5	**Maintenance sector** Large (Waste management)	Proactive	Recycling and dismantle
	Maintenance sector SME	Indifferent	Unstandardized measures

Discussions

This study examined organizations environmental management approaches. In Pakistan environmental rules induce disparities in SEM approaches, organizations react to environmental factors based on scale and regulations. Large corporations were diligent about environmental management even though it wasn't mandated by law. International companies and subsidiaries have innovative environmental management while small and medium-sized businesses lack environmental management due to budget constraints, low societal and competitive pressures. EMS and regulatory compliance explain the organization's environmental management approach. In order to

effectively handle e-waste, the government must implement strong incentives to stakeholders. The lack of cutting-edge technologies, confined returns and revenue, insufficient expertise, inadequate guidance and standards for proper collection methods hinder the adoption of circular economy in EWM (Sundar et al., 2023).

SEM is a priority in Pakistan, yet companies lack responsibility. Green business practices and environmental efforts are a growing trend, and the government wants to encourage them. All firms demonstrated a strong concern for environmental sustainability and identified regulatory pressure as the primary factor influencing their environmental management practices. E-waste is handled by firms according to their capacity, not a standard approach. In monitoring environmental performance, e-waste system formalization and EMS can help organizations and governments. An e-waste policy, domestic manufacturing, restricted imports, an adequate recycling system and awareness can assist to deal with abandoned equipment.

Theoretical Contributions

This research aimed to comprehend EWM techniques and motivators within the context of organizational SEM. This research focused on bulk consumers and included businesses of all sizes in order to provide a comprehensive picture of approaches, and discover variations from the perspective of key stakeholders. This is one of the few exploratory studies on EWM, specifically on environmental management. The study has aided in the understanding of the different organizational strategic approaches along with practices under the influence of institutional pressures. Different internal and external factors have been viewed as influencing a continuum between proactive and reactive corporate environmental strategies. Therefore, the purpose of this study was to investigate and evaluate the country's current EWM knowledge and practices, with an emphasis on the end user.

Conclusion

Electronic waste management is a key eco-innovation concern (Shahkhan, 2017). Developing countries have limited finances, making environmental management challenging. The government should include recycling incentives, industry responsibilities, and illegal cross-border trade parameters in the e-waste policy. The responsible disposal of e-waste requires not only the conscientious actions of manufacturers and producers, but also the active participation of consumers. The implementation of regulations requiring manufacturers to provide consumers with comprehensive product information, including details about composition, hazards associated with improper disposal, practices for re-use, repair, and refurbishment, as well as product lifespan, has the potential to greatly influence consumers' perceptions of their environmental impact (Murthy et al., 2022).

This study's qualitative design provided a complete grasp of bulk consumers' EWM system. Business responses to environmental practices and obsolete equipment disposal vary. ISO certifications, EMS, and CSR agendas are helping firms start pro-environmental actions, but sustainable environmental management demands more. Companies must incorporate environmental policies into their strategic management and develop proactive stakeholder participation, making environmental performance management a strategic problem.

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