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## **Technology-Enabled Service Delivery in Environmental Charities**

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### Technology-Enabled Service Delivery in Environmental Charities

**ABSTRACT:** *The implementation and improvement of technology use by non-profit organisations is important given the significant role technology plays in the delivery of services in communities. By examining six Australian environmental charities, this study aims to understand how non-profits adopt and adapt digital technologies when delivering services to their stakeholders, and the roles technology plays in fulfilling their mission. We examined publicly available documents of six large environmental charities in Australia, to understand how technology in many presentations supports service delivery and communication with stakeholder groups. Our findings provide insights into how non-profits align technology, stakeholders and service delivery, and build understanding of what technology enablement brings to the non-profit sector.*

**Keywords:** Environmental charities, technology use, non-profit organisations, information technology, information systems, digital technology

#### INTRODUCTION AND BACKGROUND

To fulfill their mission, environmental charities must be actively and effectively engaged with multiple stakeholder groups. Technology can play an important role in addressing issues of equity of access to services, timeliness, and cost-effectiveness of service delivery, and deepen engagement with stakeholders. The aim of this paper is to explore and identify patterns of how environmental charities use diverse technologies to enable their varying missions and service provisioning. Through case studies of six environmental charities in Australia, this paper maps the alignment between technology use, the stakeholder groups and service-delivery, with the overarching aim of mission fulfilment.

Throughout this paper, the term ‘charity’ will refer to organisations registered with the Australian Charities and Not-for-profits Commission (ACNC). To be registered with the ACNC, an organisation must be not-for-profit, have only charitable purposes that are for public benefit, and not be an individual, a political party, or a government entity. Similarly, we use the term ‘environmental’ charities in this paper, to refer to charities with a principal purpose of either (i) the protection and enhancement of the natural environment, (ii) the provision of information or education, or (iii) the carrying on of research about the natural environment. As the term ‘technology’ is very broad, this paper focuses on the use of software-enabled digital technologies (e.g., electronic tools, systems, devices, and resources) that generate, store, or communicate data and information specifically to aid charities in achieving their mission through the delivery services to relevant stakeholders. This will not include technology used to directly reduce society's impact on the environment, such as new irrigation systems that reduce water wastage on a farm or recycling systems.

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Studying technology use in this context within the non-profit sector is important as organisations typically lack up-to-date technology systems when compared to the private sector, due to both funding constraints and lower levels of expertise (McNutt, Guo, Goldkind, & An, 2018). An in-depth analysis of the ways in which non-profits are using technology contributes to identify patterns of where technology is or could be effectively used within the non-profit sector.

This study focuses on large environmental charities in Australia, and is driven to answer the following questions: (1) *what are charities' main uses for technology?* and (2) *how do technologies enable service delivery by charities?* The paper contributes to practical understandings of the important work of environmental charities in Australia, focusing on their stakeholder engagement. Theoretically, we contribute to the literature around technology use for service delivery, adding the new dimension of alignment to the discourse. This progresses the field by analysing how charities differentiate and adopt diverse technologies to best meet the needs of different stakeholder groups and fit with different organisational missions and purposes.

The next section of this paper offers a brief overview of the literature on technology use in non-profit organisations. The research methods are then outlined, and our analysis is described. We next present our empirical findings, leading to a short discussion of key findings. In conclusion, we highlight our contributions to research and practice, note limitations of our study, and suggest useful directions for future research.

### LITERATURE REVIEW

Academic literature on technology use for service delivery in non-profit organisations is surprisingly scant. Much of the current literature pays particular attention to social media platforms, including Twitter and Facebook (e.g., Campbell & Lambright, 2020) as well as YouTube and Instagram (Mato-Santiso, Rey-García, & Sanzo-Pérez, 2021; Waters & Jones, 2011). There is also attention paid to organisation's own websites and their content (Kim, Chun, Kwak, & Nam, 2014).

The literature on technology in non-profit organisations reveals several contrasting themes around the purposes of technology use—such as for fundraising, stakeholder engagement, and education/advocacy (McNutt et al., 2018). More recently, attention has focused on the provision of public education, both

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in the broadest sense about an organisation's mission, and around specific activities and projects. A common example is providing information about the United Nation's Social Development Goals and how the non-profit organisation's work connects with the goal(s) (Yigitcanlar, 2021).

Previous studies of technology in non-profit organisations have not dealt with the challenges of aligning technology and with organisational mission. Most studies have only focused on one element of a triad – either a particular technology or platform, a particular stakeholder group, or a particular form of service delivery to fulfill an organisation's mission (Sardi, Sorano, Giovando, & Tradori, 2022). Such approaches, however, have failed to examine the ways in which non-profits and charities tailor the fit between these three elements for efficiency and effectiveness. This is the gap we explore in this paper, outlining the ways in which the six case organisations examined have used technologies to align certain stakeholder groups with certain service delivery programs, with the overarching goal of mission achievement.

There are several key peer-reviewed journal articles about technology use and non-profit organisations which inform this research. The most recently published is by Ihm and Kim (2021a), which examines the cultural values and communication strategies of Korean non-profit organisations. Interestingly, they separately considered external communication (such as with funders, beneficiaries and partners) and internal communication, noting that these are distinctive communication processes that should not be bundled together. Ihm and Kim (2021a) concluded that 'Depending on their cultural values and practices, NPOs seem to maintain complex ways of mixing and choosing diverse ICTs' (Ihm & Kim, 2021a, p. 689)

McNutt et al. (2018) provided an excellent and wide-ranging overview of the relationship between technology use and non-profit organisations over time. Looking at data from a survey of technology and non-profit organisational behaviour in the US context, they state that 'using ICT to transform service delivery, or indeed, to offer something completely new, is happening less frequently in the sector' (McNutt et al., 2018, p. 13). However, they also note funders' interest in service delivery, 'an area where non-profit leaders have not invested their ICT expenditures' (McNutt et al., 2018, p. 13)

Most relevant to this study is the work of Hackler and Saxton (2007)—which links

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information technology use with mission-related outcomes. Based on data from a 2001 US non-profit survey, they identified six domains or competencies for technology use in non-profit organisations, and then looked at how each supports mission-related uses—highlighting the need to ‘more directly link the acquisition and utilization of IT to the organizational mission’ (Hackler & Saxton, 2007, p. 475).

Collectively, these three articles suggest that there is a relationship between the forms of technology adopted, the stakeholder groups engaged, and the services delivered against mission. This alignment is supported by two recent professional reports in the grey literature. The first is the yearly report by Infoxchange Group (2021) on digital technology in the Australian non-profit sector, which notes the highest technology priorities for the non-profit sector as being improving information security, data collection and the utilisation of websites and digital marketing. The second is a recent report by McKinsey & Company on sustaining and improving the health of the Australian non-profit sector (Dillon et al., 2021), which sets out a four-step process to increase technology uptake.

### **METHOD**

We employed a multiple case study approach (Yin, 2014) of purposively selected environmental charities and used content analysis (Weber, 1990) of publicly available documents as the primary evidence-source. The cases were chosen from the ACNC registry based on the following criteria: (i) classified as a ‘large’ charity; (ii) had a goal/mission motivated by positively impacting the environment, (iii) operating out of either Queensland or New South Wales, and (iv) preliminary scanning confirmed they used technology to support/ achieve their goal/mission. Six charities that met these parameters were selected, to form ‘pairs’ based on similarities, as outlined in Table 1. The three by two configuration of our case organisations is particularly useful as it supports comparisons within and between pairs. We next introduce the case studies, and then discuss how the data coding and analysis took place.

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Insert Table 1 about here

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### The Cases

The *Australian Packaging Covenant Organisation (APCO)* is based in New South Wales and works with businesses and the Australian Government to reduce the amount of packaging within the supply chain going to landfill. They aim to create a packaging value chain that ‘retains the maximum value of the materials, energy and labour within the local economy’ (Australian Packaging Covenant Organisation, 2020). APCO provides tools, resources, and programs that its members can utilise to design packaging that is more recyclable, resource-efficient and has a reduced environmental impact.

*Container Exchange (COEX)* was established in 2017 and introduced the Queensland wide scheme ‘Containers for Change’ on November 01, 2018. This scheme aims to ‘reduce beverage container litter, increase recycling efforts and help the community to benefit through charities, community groups and not-for-profit organizations participating in the scheme’ (Container Exchange, 2018). COEX does so through a container refund scheme which allows people to exchange eligible drink containers at designated return sites for a 10c refund, which they may choose to donate to charities.

*Climate-KIC Australia (CKA)* is a Knowledge and Innovation Community (KIC) modelled on the European Institute of Innovation and Technology (EIT). Established in 2017, and based in New South Wales, CKA’s mission is for Australia to be ‘climate resilient and liveable with a zero-carbon economy’ (Climate-KIC Australia, 2019). To achieve this, CKA links academia, business, entrepreneurs, government, and investors to drive and participate in a range of transformational activities that enhance and develop the ecosystem.

*Queensland Conservation Council (QCC)* has been bringing together communities, conservationists, and organisations across Queensland to protect, conserve and sustain Queensland’s natural environment since 1969. Through campaigns and advocacy, QCC has created National Parks and accelerated the government’s switch to renewable energy through programs like Power-up Queensland (Queensland Conservation Council, 2020).

*Desert Channels Foundation (DCF)* supports the work of Desert Channels Queensland (DCQ), one of 14 natural resource management (NRM) groups within Queensland. Formed in 2009,

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DCF supports work with communities, governments, and current and traditional owners of the land.

DCF aims to protect Australia's biodiversity and preserves its productivity through 'funding education, awareness, research and project activities' (Desert Channels Queensland, 2021).

*Terrain Natural Resource Management (Terrain NRM)* was established in 2003 and is one of 54 NRM bodies in Australia. The purpose of the NRM network is to connect governments, local groups, and landholders. The peak body of the Wet Tropics in Far North Queensland, Terrain NRM aims to empower communities to solve the region's environmental challenges through using natural resources sustainably (Terrain NRM, 2020).

### **Data Collection and Analysis Procedures**

The selected charities' annual reports for the years 2019-2021 and current website pages were downloaded and analysed. These documents provided data on each charity's technology use, evidencing specific activities and organisational actions concerning how they use technology. NVivo was used as a data management and analysis tool. Data coding took place over two rounds, with three researchers involved directly in the coding process, and data collaboration sessions held with all five researchers after each round of coding.

The coding started (*Round 1*) with the extraction of any evidence of the charities' use of technology as reported in their website and/or annual reports. Inductive coding guidelines of Glaser and Strauss (2017) were applied to the collected documents. 300+ verbatim open codes were created in this round. In *Round 2*, the coding was highly iterative, where the open codes were grouped to form coding-families, which resulted in meta themes that captured: (a) different technologies used, and (b) different technology-enabled service provisioning.

### **FINDINGS**

Our conceptualisation of technology use within the focal environmental charities considers digital technologies (software-enabled technologies) applied specifically to facilitate the delivery of quality services and to achieve targeted organizational mission objectives. This section highlights how the six charities we examined utilised technology to facilitate serving various stakeholders. We grouped the technologies we identified from our inductive analysis into four (4) broad categories: (i) *automated machines*; (ii) *digital platforms*; (iii) *mobile applications*; and (iv) *web portals*. Table 2



describes the different categories of technologies used.

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Insert Table 2 about here

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Technologies within these categories were used to achieve different objectives, aligned with the varying organisation missions and how they provisioned their services. Our analysis resulted in 4 key organisational objectives that the technology enabled across the cases, namely: (i) *Advertising and Awareness*, (ii) *Education and Engagement*, (iii) *Improved service delivery*, and (iv) *Provision of Regular Performance Snapshots*. Figure 1 visually summarises how the different technologies enabled the identified core organisational objectives; while Table 3 provide a snapshot of sample cases depicting how the technologies used aligns with the organizations' service provision. We use the three core categories of environmental services as introduced in the case selection (see Table 1).

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Insert Table 3 about here

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Insert Figure 1 about here

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The data analysis shows that technology plays significant roles in the attainment of multiple not-for-profit mission objectives. In the subsections below, we analyse the different objectives for technology use; how these targets were achieved using the featured technologies, and how each target area aligns with the core organizational service provisions.

### **Advertising and Awareness**

Advertising and awareness refer to efforts by the focal environmental charities to promote and build public understanding of their different initiatives (using various technological capabilities). Such initiatives may include packaging recyclability (by APCO)—aimed at increasing the recycling of packaging, and renewable energy generation (by Climate-KIC)—aimed at encouraging the generation, distribution, and use of renewable energy between corporate buyers and service providers. To build awareness, environmental charities leveraged several technological capabilities. For example, *Climate-KIC's* use of an online digital platform, the *Business Renewals Centre – Australia* (BRC-A) allows members to showcase their projects. BRC-A is an online marketplace platform that provides

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developers the opportunity to list their renewable energy projects and provide a range of information (e.g., minimum term and purchase volume)—thereby assisting buyers to understand the market and helping connect buyers and sellers. Similarly, the environmental charities used web portals to facilitate the uptake and sustainability of environmental initiatives. For example, APCO developed a new digital portal, the *Member Centre*, that allows members to track obligations (e.g., the status of their annual reports and action plans). Other technologies and channels used to build awareness include social media sites (e.g., Facebook, YouTube) as well as print (e.g., newspapers, newsletters) and electronic (e.g., radios, televisions) medial channels. By utilising these different technologies, environmental charities were able to record measurable progress in the uptake and delivery of their services. For example, in 2020, QCC reported that through their advertising and awareness campaigns, dozens of people signed up to volunteer through their website. In a similar vein, COEX recorded significant increase (over 200% between 2020 and 2021) in the number of people taking steps to learn about their initiatives.

### **Education and Engagement**

A key focus of environmental charities is to educate and positively engage with different stakeholder groups regarding the uptake and ongoing use of their various environmental initiatives. Technologies that are instrumental in this regard include digital platforms, mobile applications, and web portals. Although these technologies vary in their operational context, a common theme is their ability to foster engagement and educate diverse interests. Each technology was tailored to achieve specific objective(s), sometimes using specialised channels. For example, Climate-KIC's BRC-A roadmap—an online tool hosted on the BRC-A platform—was used to educate buyers and to bring standardisation to their corporate agreement transaction process. This tool, which offers insight into customer options and contract negotiating tactics and procedures, is crucial to the actualisation of renewable energy commitment by participating companies—a cause championed by Climate-KIC. Most of the environmental charities also created web portals to facilitate engagement with different stakeholder groups. For example, in 2020, QCC held over 23 webinars for their members using Zoom and YouTube channels. These webinar series offered training sessions to upskill members and facilitated digital spaces to help keep people connected. A similar objective was achieved by

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Container Exchange using the *Change.Bot* feature on their Container Exchange app, which served as a contact centre designed to improve customer engagement and to answer frequently asked question (FAQs).

### **Improved Service Delivery**

We found that technology is a useful asset in advancing their own sustainability and improving service delivery for the environmental charities we investigated. For example, the deployment of reverse vending machines across several cities in Queensland enabled COEX to make it easier for people to recycle their containers. In April 2022, COEX reported that the introduction of the reverse vending machines—a technology designed to allow the disposition of a recyclable container in exchange for rewards—led to the record-breaking collection of over 2.2 million containers (with 217,059 collected in March 2022 alone). Similarly, with the development and launch of mobile applications, the environmental charities recorded significant improvement in service delivery. For example, the launch of the ‘Fulcrum mobile app’ by Desert Channels provided participating communities with a means of reporting natural resources issues as well as capturing feral animals and weed locations. These data were valuable in making on-ground decisions regarding the effective management of natural resources.

### **Provision of Regular Performance Snapshots**

To demonstrate the value of their services and engagement to various stakeholder groups, environmental charities utilise technologies to provide regular performance snapshots both for their customers and for internal use. Performance snapshots provide access to regular and/ or real time information and feedback on initiatives. For example, the APCO annual reporting tool is an online platform that allows APCO members to complete their annual report and action plan; and the APCO packaging sustainability framework facilitates progress tracking and impact assessment. Desert Channels developed a community research portal which provides access to real time information regarding natural resource management for effective decision making. In 2021, COEX reported that its introduction of a digital reporting tool was responsible for enhanced visibility of their scheme performance—providing visibility of customer interactions and valuable insights on customer demographics—all of which were instrumental in streamlining business process to improve

information efficiency.

### **DISCUSSION**

The results of this study demonstrate that non-profit organisations are utilising different technologies to tailor their service provision to key stakeholder groups. The variety of mechanisms and approaches adopted by the organisations are notable and suggests a degree of responsiveness and experimentation by non-profits in their service delivery to stakeholders. One of the key findings from this study is the realisation that the participating organisations actively align diverse technological capabilities to achieve unique mission objectives in Recycling / Packaging; Conservation; and Education/Advocacy—covering multiple stakeholder groups (e.g., customers, manufacturers, resource managers, etc.).

The implications and relevance of these findings relate to the allocation of resources by non-profits in the most efficient and effective ways. It is evident that technologies are providing multiple options to directly connect different stakeholder groups with services delivered by non-profits such as (1) renewable energy generation and distribution (e.g., Climate-KIC), (2) reduction in packaging and improvement of packaging design for recyclability (e.g., APCO), (3) promoting economic and environmental impact initiatives (e.g., COEX), as well as (4) monitoring and managing natural habitats (e.g., Desert Channels)— and the list here is not exhaustive.

As mentioned in the literature review, prior studies tend to focus on one aspect or element of the alignment between stakeholders, technologies, and mission. Our findings offer preliminary, exploratory evidence that non-profit organisations address all three at a strategic level, whether by initial design or by evolution through both stakeholder and internal feedback. These design and feedback mechanisms are outside the scope of this study but are worthy of future research.

The six domains of technology competencies developed by Hackler and Saxton (2007), and three mission-related uses of IT are extended through this study. Our findings regarding Advertising and Awareness; Education and Engagement, Improved Service Delivery and Provision of Regular Performance Snapshots map to the organisational mission/objective and target of technology use (see Figure 1).

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We found no significant misalignment between technology use and non-profits' mission, noting instead that the use of technology is fit-for-purpose. What is unclear is how the alignment of IT at the operational level with stakeholder needs changes over time, or in response to external events and shifts. It would be remiss not to note the impact of the COVID pandemic on technology adoption and uptake as both non-profits and stakeholder groups moved rapidly to change modes of service delivery in response to uncertainty and lockdowns in many Australian states.

### CONCLUSION

This study set out with the aim of assessing the uses and importance of technology in the service provisioning of environmental charities. The objective of this study was to identify what technologies were being used by six case organisations, to provide services to their key stakeholders, and thus deliver on their missions. Our findings regarding the alignment between these three elements – technologies, stakeholders, and missions – contribute to and extends the literature on technology enabled service delivery and mission fulfilment in the not-for-profit sector.

Our findings will be of interest to non-profit sector organisations and funders who seek to improve and increase the use of technologies in non-profits to enhance their sustainability. Individual organisations may also benefit from thinking about the alignment within their own work and paying greater attention to technology as a dimension of their overall strategy. Stakeholder groups can be more active voices in their non-profit partnerships, utilising technology-enabled means to do so.

We acknowledge several limitations of this small-scale, exploratory study. Our focus on large charities excluded those with less revenue, for whom technology choices are more limited. By focusing on environmental charities, we did not consider those working in other sectors, for example health or human services, where service delivery to stakeholders is arguably more complex. Further, a larger sample and correspondingly different research methods and design would improve the generalisability of future research. Such future research might address unanswered questions around the design and resourcing of technology strategies, incorporate the perspectives of external stakeholders, and consider arguments against technology adoption in non-profits. (Campbell & Lambright, 2020; Glaser & Strauss, 2017)

We recognise and pay credit to the environmental charities that work in diverse ways to

benefit to the Australian community. Beyond our interest in their technology alignment, we value and appreciate the multiple ways in which they deliver on their commitment to their environmental missions.

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## TABLES AND FIGURES

**Table 1. Summary overview of the six environmental charities selected**

Mission focus	Recycling / Packaging	Conservation	Education/Advocacy
Charities	APCO	Desert Channels QLD	Climate-KIC Australia
	Container Exchange	Terrain NRM	QLD Conservation Council
Similarities	<ul style="list-style-type: none"> <li>- Packaging and waste reduction.</li> <li>- Recycling management.</li> </ul>	<ul style="list-style-type: none"> <li>- Natural resource management</li> <li>- Economic &amp; Environmental sustainability</li> </ul>	<ul style="list-style-type: none"> <li>- Harmful emissions reduction</li> <li>- Nature and biodiversity conservation</li> <li>- Collaboration towards a safe climate.</li> </ul>

**Table 2. Technologies used by the environmental charities**

Technology	Description
Automated Machines	Automated solutions (e.g., reverse vending machines that use shape recognition technology to facilitate recycling and packaging).
Digital Platforms	Online marketplaces (e.g., Business renewables centre that connects service providers and corporate buyers seeking offtake regarding who can help facilitate their deals).
Mobile Application	Mobile, digital applications that facilitate customer access to packaging and recycling information and facilitate interaction between environmental charities and their diverse stakeholder groups.
Web Portals	Online tools (e.g., websites) that promote the sharing of information with different stakeholder group.

**Table 3. Technology Alignment with Organizational Service Provisions**

Technology Used	Organizational Service Provisions		
	Recycling/ Packaging case	Conservation case	Education/ Advocacy case
Automated Machines	Reverse Vending Machines were launched in 2020 by COEX to facilitate efficient and convenient container collection, and to encourage participation in recycling by locals and	Not Applicable	Not Applicable

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	other stakeholder groups.		
<b>Digital Portals</b>	Not Applicable	Not Applicable	<b>Business Renewables Centre – Australia (BRC-A)</b> — is a member-based digital platform designed by Climate-KIC to provide buyers and professional service providers the ability to search for available projects and contact developers directly.
<b>Mobile Applications</b>	<b>The Container for Change app</b> was launched to facilitate customer engagement with recycling—by enabling customers to find their closest container refund points (CRPs) and scan containers to check eligibility from any location.	<b>The Fulcrum App</b> was developed by <i>Desert Channels</i> to facilitate their work on fire threat management. The app assist observers to gather data and calculate fire danger index—which helps to reduce fuel loads and future bush fires.	Not Applicable
<b>Web Portals</b>	<b>Packaging Recyclability Evaluation Portal (PREP)</b> is an online portal launched by APCO that allows members to assess the recyclability of their packaging in the Australia and New Zealand systems.	<b>Community Mapping Portals</b> (e.g., Barron Catchment Care) were created to facilitate data collation and dissemination regarding the whereabouts of ideal habitats, future population trends, and the potential effects of changing climates.	<b>Social Media Portals</b> (e.g., Facebook, Instagram, YouTube, etc.) were utilised by <i>QCC</i> to share, connect, collaborate, and strengthen their scheme to conserve and restore wildlife.



**Figure 1. Organizational Missions and Technologies Used**

