Paper Recycling at Queen’s University and its Waste Implications

By

Olivia Ferguson

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Abstract
The procurement and disposal of paper commodities presents a unique case in respect to municipal solid waste at Queen’s University at Kingston, ON. Using Queen’s University Admissions viewbook & Queen’s Alumni Review magazine as a case study, this thesis investigates how the procurement, distribution, and disposal of these paper commodities can be altered to better align with the Resource Productivity & Recovery Authority’s, Ontario Regulation 391/21, made under the Resource Recovery & Circular Economy Act, 2016. The aim of this project was to investigate whether printing volumes of these products were altered upon the onset of Covid-19, and how the lifecycle of these publications creates environmental implications. Using primary and secondary research, I concluded that a complex pathway exists in the end-of-life management of these products, due to their composition, and thus, compatibility with Kingston, ON, recycling programs. As such, alternatives to these documents including an online format present a more sustainable medium-- should these commodities continue to be produced. However, a purely digital delivery of these documents also displays environmental concerns, preventing Queen’s University from reaching its highest potential to align with the Resource Productivity & Recovery Authority’s legislation related to individual producer responsibility (IPR).
Acknowledgments

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<th>Symbol</th>
<th>Definition</th>
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<tr>
<td>CPG</td>
<td>Continental Paper Grading</td>
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<tr>
<td>IPR</td>
<td>Individual Producer Responsibility</td>
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<tr>
<td>MSW</td>
<td>Municipal Solid Waste</td>
</tr>
<tr>
<td>KARC</td>
<td>Kingston Area Recycling Centre</td>
</tr>
<tr>
<td>O. Reg 391/21</td>
<td>Ontario Regulation 391/21 (BLUE BOX)</td>
</tr>
<tr>
<td>MB</td>
<td>Mega-byte</td>
</tr>
<tr>
<td>QAR</td>
<td>Queen’s Alumni Review</td>
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<tr>
<td>RPRA</td>
<td>Resource Productivity &amp; Recovery Authority</td>
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Introduction:

Municipal Solid Waste (MSW) refers to materials that are discarded from residential and commercial sources, or as materials that have ceased to have value to the holder (Vergara & Tchobanoglous, 2012). Waste which is considered recyclable presents a unique case in Ontario. Dealing with waste involves extensive government regulation, all of which contribute to the ways in which recyclable and other solid waste produced by institutions is managed. Therefore, these regulations not only have environmental implications, but also alter the ways in which institutions procure, distribute, and dispose of materials and commodities. In 2021, the Resource Productivity & Recovery Authority (RPRA) enacted Ontario Regulation 391/21 (O. Reg 391/21), under the Resource Recovery and Circular Economy Act (Government of Ontario, 2021). The RPRA asserts that Ontario is shifting from a linear to a circular economy (Government of Ontario, 2021). Thus, the legislation was created to promote individual producer responsibility (IPR) related to recyclable material. To establish IPR, the RPRA defines a producer as one who conducts any of the five actions outlined in O. Reg 391/21 (see appendix A). Under these definitions, institutions in Ontario including universities and colleges are considered producers.

Queen’s University demonstrates a unique case related to the implications of O. Reg 391/21. Of the 3,434,620.00 kg of waste generated by Queen’s University in 2016, 43.23% was recycled (GFL Environmental, 2016). Continually, the school’s 2016 waste audit highlights the high volume of paper consumed by the establishment. Particularly, paper commodities were reported as constituting 18.23% of the total waste generated annually in 2016 (GFL Environmental, 2016). These figures, combined with O. Reg 391/21, demonstrate a need to address paper consumption and disposal habits at the institution.
Using a case study involving the Queen’s University Admissions Viewbook and the Queen’s Alumni Review magazine (QAR), this piece works to identify the environmental implications involved in the production, distribution, and disposal of two major paper commodities produced by Queen’s University. The objective is to examine the changes to the printing and distribution patterns of viewbook and QAR documents before and after the onset of the COVID-19 pandemic. As well, the issues related to the disposal and end-of-life management of these two products are identified. An empirical study was conducted using archival research and semi-structured interviews. This analysis will begin with a literature review defining key legislation and related elements involved the lifecycle of these two products. Finally, conclusions will be provided which will identify how Queen’s University can alter the distribution of these paper products to best align with legislation put-forth by the RPRA.

**Literature Review:**

In recent years higher education has become increasingly corporatized and more about selling the student experience (Davidson, 2015). Historically within Ontario, all universities were publicly funded. However, reports from the early 1980s documented the difficulty of continuing to publicly fund the rapidly expanding higher education system (Clark et al., 2009). It is noted that the Ontario government largely ignored these reports, and consequently, Ontario universities have suffered from funding deficits. This has led universities and colleges to find creative ways to secure more funding. As a solution, universities and colleges have begun emphasizing measured outputs such as strategic planning, performance indicators, quality assurance measures and academic audits (Olssen & Peters, 2005). Such measurements are used to entice prospective students (to increase revenues) and secure funding from alumni. To compile and present these
performance indicators, documents such as viewbooks and alumni magazines have arisen. The following two sub-sections will provide detail on these two publications and their importance as marketing tools at Queen’s University.

*Viewbooks:*

Viewbooks are ‘glossy multi-page brochures’, which universities and colleges distribute to thousands of prospective students annually (Hartley & Morphew, 2008). Thus, an entire industry and market now exists to aid institutions in the design and production of these publications. Most viewbooks differ somewhat in length, and all the viewbooks typically showcase mission statements, messages from the reputable staff members (i.e, Deans, Principal, and/or the Chancellor) in addition to information about athletics and exchange programs (Hartley & Morphew, 2008). Printed versions of these documents are composed of full-color, glossy pages to highlight text and splashy images (Hartley & Morphew, 2008). Queen’s University describes their viewbook as:

> a comprehensive overview of this extraordinary university from an undergraduate perspective, with details on our academic programs, extra-curricular activities, and the community-minded spirit we call our "broader-learning environment." (Queen’s University, 2022)

Universities and degree-granting colleges receive most of their funding from the government and tuition fees (Government of Canada, S. C., 2017). Thus, viewbooks can be viewed as a tool to promote their institutional excellence—in hopes of securing higher levels of matriculation to the university or college. Viewbooks play a vital role in the courtship between a student and their decision on a university/college campus (Hartley & Morphew, 2008). Therefore, these documents play remain imperative in securing sufficient enrollment rates and therefore, funding for universities and colleges. However, gaps in literature exist surrounding the ways in which
both the production and disposal of these books impact sustainability objectives such as the United Nations Sustainable Development Goals. Similarly, information is lacking regarding how display of a viewbook through an alternative medium (i.e digital pdf) impacts the marketability of the publication. Currently, versions of the Queen’s Admissions viewbook are available for review online. However, hardcopy versions of the document also remain available and continue to be distributed at events such as the Ontario University Fair, and Queen’s University Campus Tours.

*Queen’s Alumni Review Magazine:*

According to the university, Queen’s Alumni Review is the most trusted, familiar, and well-branded magazine of Queen’s University (Queen’s University, 2022). Unlike magazines which are produced by individual faculties (i.e., Smith Magazine), QAR is produced by the Office of Advancement. Established in 1927, the magazine has been produced quarterly (February, May, August, and November) for the last 95 years. The institution notes that circulation of the magazine is typically 125,000 hard copies/year. These documents are distributed free of charge to alumni, friends of the university and to campus departments. Contrary, subscriptions for non-alumni (and the above-noted groups) are $25/year.

The purpose of alumni magazines is to sell colleges and universities to their past customers. Thus, like other documents produced by the Queen’s University, QAR is mainly recognized as a marketing tool. Common topics featured in alumni magazines involve new knowledge coming out of research on the university or college’s campus. Despite these segments of the magazine, the prime marketing function of alumni magazines is to keep strong ties to the alma mater. This is done to raise money from people who previously attended the institution and made their last tuition payment years ago. Such claims are supported in relation to QAR.
According to Queen’s Gazette, 46.5 million dollars were contributed through donation to Queen’s-by-Queen’s alumni in 2013, and 274 million dollars were generated by Queen’s alumni (in campaign contributions) between May 1, 2006 – April 30, 2014 (Queen’s Gazette, 2022). As demonstrated by these statistics, QAR remains an important marketing tool for Queen’s University. However, environmental implications related to the composition and distribution of the books presents challenges when analyzing how these magazines are disposed at their end-of-life.

*Resource Recovery and Circular Economy Act, 2016*

*The Resource Recovery and Circular Economy Act* passed June 1, 2016 (Government of Ontario, 2021). The 2016 legislation was created to help Ontario shift to a circular economy. The RPRA defines a circular economy as an economic system in which products and packaging are designed to minimize waste and then be recovered, reused, recycled, and reintegrated back into production (Resource Productivity and Recovery Authority, 2022). To achieve these objectives, the *Circular Economy Act*, introduced a producer responsibility framework. This system was set in place for products and packaging in Ontario (Resource Productivity and Recovery Authority, 2022). As a result, brand holder’s and other persons with a commercial connection to products or packaging became accountable for recovering the associated resources and reducing associated waste. The Government of Ontario suggests that IPR is a key driver in the circular economy. IPR ensures that producers accept responsibility for collecting and managing their products and packaging after consumers have finished using them (Resource Productivity and Recovery Authority, 2022). The *Circular Economy Act* also established the RPRA to regulate businesses and ensure their compliance with IPR requirements. IPR requires producers of products and packaging to meet mandatory and enforceable targets for the collection and recycling of their products and
packaging (Resource Productivity and Recovery Authority, 2022). Further, with IPR, producers have choice in how they meet their requirements. These specific requirements are outlined in O. Reg 391/21.

O. Reg 391/21

On June 3, 2021, the RPRA (under the Minster of the Environment, Conservation & Parks) announced the filing of regulation O. Reg 391/21. As an extension of the Circular Economy Act, O. Reg 391/21 outlines the ways in which producers of products and packaging will be enforced to meet the mandatory targets for the collection and recycling of their products and packaging as outlined in the Circular Economy Act (Resource Productivity and Recovery Authority, 2022). The consequence of the regulation is the transfer of financial and operational responsibility of Ontario’s Blue Box program to the producers of plastic and other packaging (Ontario Waste Management Association, 2021). To define who is a producer of blue box material, the RPRA first prescribes three categories for material, followed by seven sub-categories which are assessed under the regulation and outlined in Table One:

<table>
<thead>
<tr>
<th>“Blue box material” means material that is,</th>
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<tr>
<td>a)  blue box packaging</td>
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<tr>
<td>b)  a paper product, or</td>
</tr>
<tr>
<td>c)  a packaging-like product.</td>
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**Material categories: the following are material categories for the purposes of this Regulation:**

1. Beverage container material category.
2. Glass material category.
3. Flexible plastic material category.
4. Rigid plastic material category.
5. Metal material category.
6. Paper material category.
7. Certified compostable products and packaging material category.

**Table One.** Definitions of blue box material and material categories pertaining to O. Reg 391/21, as described in section Part One of Reg. O 391/21.
Under these terms, Queen’s University is considered a producer of paper materials through the publication and distribution of paper commodities such as viewbooks and QAR. The allocation of this role also aligns with Part II of the legislation outlining that where paper products or packaging-like products are supplied in Ontario to a consumer, the person who is the producer of the paper products or packaging-like products shall be determined in accordance with three rules (see Appendix B). As both viewbooks and QAR are branded as products of Queen’s University, they align with rule #1 (see Appendix B). The complete transfer of Ontario’s Blue Box program to the producers will take place between July 1, 2023, and December 31, 2025 (Resource Productivity and Recovery Authority, 2022). However, as of September 30, 2021, Ontario universities and colleges were required to register as producers. Consequently, Queen’s University must submit supply data to Stewardship Ontario beginning 2022—this includes quantities of paper products produced, such as viewbooks and QAR.

Supply data reported to Stewardship Ontario is significant. As stated, reporting will be done on an annual basis beginning 2022. To conduct reports, the weight of the blue box material in each material category supplied to consumers in Ontario (in the previous calendar year) will be reported. Should the weight reported by producers exceed a certain threshold, said producer will become responsible both financially and operationally for a portion of Ontario’s Blue Box program. Therefore, producers such as Ontario universities and colleges will likely need to find ways in which to reduce their volumes of materials required to report under O. Reg 391/21 (including paper materials).

Recycling in Ontario

Recycling is used as the gold standard for waste diversion in many neoliberalist societies (Liboiron, 2010). Despite the proliferation of curbside pick-up programs and public awareness
campaigns across Canada, statistics demonstrate a paradox existing between how recycling is marketed, and the true outcomes of the process. Literature notes that over the past three decades, increased waste generation and a depleting availability for landfill space have made recycling an important process in Ontario (Lakhan, 2014). More importantly, the 3R acronym of “Reduce, Re-Use and Recycle” has become a ubiquitous phrase that has led to a turning-point in consumer consumption and disposal habits (Lakhan, 2014).

The Ontario Blue Box program began in Kitchener Ontario in 1981 (Stewardship Ontario, 2013). This program was initiated in response to local pressures urging municipalities to take action to reduce waste. By 1998, ninety percent of Ontario residents had access to the program, and participation was observed at a rate of ninety percent (Stewardship Ontario, 2013). Despite high levels of participation in the Blue Box program, not all materials placed in blue bins are truly diverted from landfills. The success of a recycling program is heavily dependent on a consumer’s ability to properly recognize recyclable material, and properly separate such recyclables from the waste stream (Lakhan, 2014). This portion of the recycling process places ownness on consumers. For recyclable MSW to be truly diverted from landfill it must fit criteria outlined by the Blue Box program and placed in the proper bin. Many programs exist at Queen’s University emphasizing the importance of this step in the recycling process. For instance, Sustainable Queen’s has used advertising tactics to promote the importance of paper waste being sorted by the consumer. Posters related to the recycling of mixed paper at Queen’s University suggest that products mustn’t be food-spoiled and outlines which bin consumers must dispose of the waste in (see Appendix C).

A second issue arises upon the proper disposal of recyclable of MSW. When referring to a commodity such as a viewbook or magazine, these products are only diverted from landfill in
certain cases. The decision of a recycling facility to divert materials from landfill is dependent on a variety of factors. For instance, a recyclable material may be selected for recycling based on the simplicity in taking the product apart, material security index, maturity of recycling technology and monetary value of materials under assessment (Sultan and Mativenga, 2017). Ultimately, this aspect of recycling demonstrates that that monetary value of a product (amongst other variables) contributes to its desirability as recycled material. This illustrates the gap between public perception on recycling, and the actuality of the process. When consumers dispose of products such as viewbooks and/or magazines using the Blue Box program, they likely assume the documents are destined to be broken down and re-used. However, depending on the desirability of the materials (based on the criteria above) they may instead be sent to landfill. Continually, it must be noted that the elements such as glue, staples and binding to help construct documents such as QAR and viewbooks, contribute to factors such as simplicity in taking the product apart. Additionally, items such as staples fall into a recycling stream separate from that of paper, increasing the complexity of the end-of-life pathway of magazines and viewbooks.

Recycling also poses a paradox in terms of its environmental implications. Issues such as CO₂ emissions arise when considering the transportation needed to recycle materials. Whether a product is disposed of on a university or college campus, or through curb-side pick-up program, it must make its way from said location to an end-of-life management facility. Specifically, in Kingston ON, Canada, waste disposal is contracted through companies such as Waste Management of Canada, and BFI Canada (Hird et. al, 2014). These contractors are responsible for collecting materials placed in blue bins and transporting them to facilities such as Kingston Area Recycling Centre, or the Brockville Waste Management Transfer Station. To do so,
requires expenditure of carbon and fossil fuels (Hird et. al, 2014). Notable, is that the MSW not selected for recycling (upon arrival at a recycling facility) must then be transported to landfill. Due to Kingston’s lack of landfilling sites, in some cases paper and other recyclable materials are transported hundreds of kilometres (Hird et. al, 2014).

Recycling is seen as a social and environmental good. Therefore, it is an activity promoted as the basis for improved resource stewardship and conservation in Ontario (Lakhan, 2014). However, models such as the waste hierarchy pyramid suggest that institutions could demonstrate far greater sustainability by reducing production and increasing IPR (Hultman & Corvellec, 2012). Such literature provides a need to address ways in which institutions such as Queen’s University may reduce their output of material categories (i.e., paper), rather than focussing on how to manage high levels of paper and other recyclable waste.

The Present Study

Using the Queen’s University Admissions viewbook and QAR as a case study, this thesis is focussed on examining the environmental implications of these two paper commodities. In addition, the objective of the study was focussed on how the production of these documents should be altered to better align with the objectives of O. Reg 391/21.

The lifecycles of these two products are categorized into three stages: procurement, distribution, and disposal. Each stage in the lifecycle is managed by a different facility. Although procurement is controlled by Queen’s University, the production of the documents is conducted through Gilmore Reproductions—a full service commercial printer in Kingston, ON. Distribution of the viewbooks and magazines are then managed by two departments at Queen’s University. The viewbooks are distributed by Queen’s University Undergraduate Admission and Recruitment. Contrary, QAR is dispensed by the Office of Advancement. The final stage in the
lifecycle is disposal. According to marketing tools produced by Sustainable Queen’s, Queen’s University encourages consumers to dispose of non-food-spoiled paper or cardboard in recycling bins (see Appendix B). Similarly, the City of Kingston suggests all flyers, junk mail, magazines, and office paper (all colours) to be placed in recycling bins for curb-side pickup (City of Kingston, 2022). Thus, in this investigation it is assumed that viewbooks and magazines are mainly placed in recycling streams as opposed to streams destined for landfill (both on and off-campus). The destination of waste will flow through a specific pathway depending on whether it is disposed of on or off the Queen’s University campus. Queen’s University uses a contracted waste hauler to remove waste and recycling from the campus. As a result, recycling materials from the University are collected and sent to the Brockville Waste Management Transfer Station. Meanwhile, the City of Kingston has its own recycling facility known as the Kingston Area Recycling Centre (KARC). Although this difference creates discrepancies in the distances travelled by the waste, the University notes “the two systems are very similar” (Queen’s University Facilities, 2022). The steps in the City of Kingston’s paper recycling process are important to understand, as this thesis will analyze the environmental implications of said procedures. This process will be elaborated on throughout the results and discussion segments of this paper.

Methods

Securing primary empirical data for this project proved to be difficult. Obtaining data on Queen’s University printing volumes and marketing strategies required a high level of communication across a variety of departments and external institutions. Conducting interviews with stakeholder’s both within and outside of the University would have been better suited to a study conducted over a longer timeframe and outside the constraints of Covid-19 restrictions. To
accommodate for the short time and the inability to conduct non-participant observation studies, the two main organizations involved in the printing and disposal of viewbooks, and magazines were contacted—Gilmore Reproductions and Solid Waste Services at the City of Kingston, respectively. Due to provincial-wide restrictions put in place because of the Covid-19 pandemic, neither facility was conducting tours or in-person meetings during the time of the study. Therefore, observational methods involving the printing and disposal process of these documents were impossible for this project. Instead, the specific methods for this project included archival research as well as semi-structured interviews. These methods were most suitable for the allotted research time and allowed the necessary information to be obtained to answer research questions and analyze the research objectives.

Archival research was the primary form of qualitative data collection to assess the ways in which Queen’s University produces viewbooks and QAR. To critique the ways in which production of viewbooks and QAR may be altered to align with O. Reg 391/21, data on the current operation of Queen’s recycling practices and paper printing volumes were also investigated. Data collection involved the review of several forms of documentation. To determine whether the printing of viewbooks and QAR increased or decreased upon the onset of Covid-19, printing volumes were requested from Gilmore Reproductions. These figures were requested through Gilmore Reproduction’s Corporate Social Responsibility (CSR) coordinator. Virtual copies of both the admission’s viewbook and QAR were obtained from public websites managed by Queen’s University. Analysis of such documents allowed for the comparison of viewbook and QAR length. Length of the documents was analyzed as publications with a greater page length increase the volume of paper needed to print hard copies of these documents. The Admissions viewbook is published annually, thus the length of each annual edition was recorded.
Contrary, the QAR is published quarterly. To account for this, the median length of QAR for each calendar year was recorded. This was done by finding the average page length of the 4 issues of magazines published each year for a 7-year period.

In addition, regulatory documents including annual reports (i.e. statement of financial position, income statement, and enrolment report) were assessed to compare revenues and other fiscal outcomes related to the objectives of viewbooks and QAR (as described in the literature review). Specifically, reports for the academic year 2019-2020 were compared against the 2020-2021 academic year. These years were selected on the basis that the Covid-19 pandemic commenced between these two periods. In this project it is assumed that the onset of a virtual environment due to Covid-19 may have caused a disruption in the volumes of paper printed between these two academic periods.

Semi-structured interviews were the secondary form of qualitative data collection used in this project. A semi-structured interview format was most ideal for this study. This format allowed for the use of an interview guide while also permitting for flexibility with questions specifically related to the facility under review. Specifically, interviews were conducted to help determine a) whether the City of Kingston would accept viewbooks and QAR as recyclable material, and b) how the recycling process of these two products would proceed should they be destined for disposal through the City of Kingston. The general interview question guide that was used can be found in Appendix D.

The City of Kingston, Solid Waste Services was chosen for interview. The semi-structured interview took place with one facility member from the City of Kingston, Solid Waste Service. The City of Kingston was chosen for interviews as any viewbook or copy of QAR disposed of within the Kingston community would be recycled through this facility. This study
was conducted as part of the project: GENSC-057-13 Canada’s Waste Future: Uncertainty, Futurity, and Democratic Engagement; ROMEO # 6010532. The contact information for the interview participant was obtained through Llynwen Osborne, Waste Coordinator at Queen’s University. The participant was contacted by e-mail with information on the study and a request to for an interview. Once the participant responded to the e-mail request, an interview was scheduled through Zoom. The participant was provided with background information to what the study was, in addition to a letter of information which was signed and returned prior to the interview taking place.

Viewbooks and copies of QAR disposed of on Queen’s University campuses would be transported to Brockville Waste Management Transfer Station, not KARC. Due to the levels of bureaucracy of Waste Management Inc., and the time allotted for this project, interviews were unable to take place with a member of this facility. However, as noted by Queen’s University Facilities, “the two systems are very similar” (Queen’s University Facilities, 2022).

**Results**

*Printing Volumes:*

Upon several attempts to obtain printing records from Gilmore Reproductions, the CSR was unable to provide the data pertaining to both viewbooks and magazines for the 2019-2020 and 2020-2021 periods. In lieu of this information, Llynwen Osbourne provided procurement records of the University’s annual purchases from Staples for 2019 and 2020 periods. The information was provided in a spreadsheet where the volumes of paper purchased is reported in lbs. The product of interest for this investigation was “paper, brochure, glossy, 11x17”, product number HEWCG932A. The weights and total prices of these products are summarized in Figure 1 and Figure 2.
Figure 1. Spreadsheet displaying the volumes of “paper, brochure, glossy, 11x17” product number HEWCG932A purchased by Queen’s University in 2019.

Figure 2. Spreadsheet displaying the volumes of “paper, brochure, glossy, 11x17” product number HEWCG932A purchased by Queen’s University in 2020.

Length of viewbooks and QAR

The page count from a total of 6 viewbooks over an 8-year period were surveyed. Issues of QAR were analyzed over a 7-year period. Since QAR is published periodically, the median page length for the year was calculated for all four issues produced during the calendar year. A subscription to QAR was not obtained. Therefore, only access to archival documents for the last 7-years (2015-2021) were available online. Viewbooks can be obtained without subscription. Therefore, they were gathered from university websites for an 8-period (2015-2022). QAR page
lengths were analyzed for the period 2015-2022. The dates and pages lengths of viewbooks are shown in Figure 3. The median pages lengths of QAR documents are shown in Figure 4.

**Figure 3.** Bar graph displaying the length of Queen’s Admission’s Viewbook plotted against the year of publication for the period 2015-2022.

**Figure 4.** Bar graph displaying the median page length of QAR plotted against the year of publication for the period 2015-2021.
Semi-Structured Interviews

After conducting the semi-structured interview with the City of Kingston, Solid Waste Services, it was found that generally, Queen’s Admission viewbook and the QAR are accepted with the City of Kingston as recyclable material. More specifically, this means that upon arrival at KARC these commodities are kept in recycling streams, rather than being removed and instead selected for landfill. Recall from the literature review, the selection of a material for recycling depends on variety of factors such as: simplicity in taking the product apart, material security index, maturity of recycling technology and monetary value of materials under assessment (Sultan & Mativenga, 2017). When asked about what factors contribute to viewbooks and QAR being selected as recyclable material, the respondent explained that glossy-like paper for which both QAR and viewbooks are composed of, is considered high-quality fibre material. This attribute means the material has a high monetary value. The respondent also noted that in the case of a viewbook or QAR containing a low level of contamination (i.e., food contamination or moisture) the paper is still be considered to have a moderate material security index. This lower-quality fibre material can be recycled into commodities such as egg cartons or paper-trays. In opposition, if the paper contains a high level of moisture or extreme contamination, it is removed from the stream and destined for a landfill.

To gage the environmental implications of the recycling process (of these two products), the interviewee provided details on the paper recycling process specific to the City of Kingston. First, it was explained that for paper to make its way to KARC it must be sorted and placed in the correct bin (i.e blue bin). Once at the facility, all the contents of blue bin then go through a hand-sorting process. When asked how this process takes place at KARC, the interviewee explained that a reverse-sorting technique is used. This process involves the removal of waste
materials (i.e garbage, plastic, or metals) which may have been mixed into the paper stream, as opposed to separating the paper from these other materials. A significant finding for this study was that upon the sorting of the material, paper selected to stay in the recycling stream is “bailed and shipped off for processing”. During the initial interview, the respondent was unable to provide the locations or distances travelled by materials upon shipment—as this depends on the organization purchasing the material. Since paper materials are sorted and held at KARC before being purchased by companies, the respondent was contacted via email proceeding the interview with a request for information regarding which companies contract with KARC. The respondent did not follow-up with this information. However archival research indicated merchants including ‘Continental Paper Grading’ (CPG) remain a leader throughout Canada for independent wastepaper purchasing. Keeping this in mind, estimates can be made regarding the distances travelled by paper upon department from KARC. With offices stationed across Eastern Canada and the United States, recycled paper originating from viewbooks, and magazines may potentially travel thousands of kilometres to be refurbished and recycled into new products (assuming CPG purchases and collects these products).

Discussion

Transferring to strictly virtual distribution of both viewbooks and QAR would allow the university to reduce its outputs under the ‘paper materials’ category, which must be reported to Stewardship Ontario as per O. Reg 391/21. In theory this recommendation would reduce the likelihood of Queen’s University being assigned a larger portion of the financial and operational responsibility of the Ontario Blue Box program. In a similar context, reducing the amount of paper procured and distributed helps Queen’s University increase their IPR—an objective of both the 2016 Circular Economy Act and O. Reg 391/21. However, a shift to a purely online
format could disrupt the success of these marketing tools. Also, although electronic versions of these documents would eliminate the environmental implications involved in the recycling and landfill of paper materials, the environmental consequences of electronics (such as their contributions to CO₂ emissions) must be considered. Using the results obtained in this project, alongside regulatory documents produced by Queen’s University, this portion of the project will seek to provide the best recommendations for the school surrounding the distribution of viewbooks and QAR, in relation to sustainability and O. Reg 391/21.

The procurement records for the product “paper, brochure, glossy, 11x17”, indicate the university reduced their consumption of the product by nearly ½ between 2019 and 2020. This contrast in volume can be compared to the enrolment rates as per the Queen’s Enrolment Report 2019-2020 and the Queen’s Enrolment Report 2020-2021. The enrolment report demonstrates a total enrolment of 19,480 undergraduate students for the 2020-2021 academic period (Queen’s University Office of Provost, 2020). In contrast, 25,260 students were enrolled in undergraduate programs for the 2019-2020 academic year (Queen’s University Office of Provost, 2019). The report also indicates that between 2018 and 2019 there was an observed 7.7 percent increase in undergraduate applicants that ranked Queen’s University as their first choice of school (Queen’s University Office of Provost, 2019). Student surveyed for these statistics would have received that 2019 Admission viewbook. However, only 5.5 percent of students who would have been exposed to the 2020 viewbook ranked Queen’s University as their top choice of university (Queen’s University Office of Provost, 2020). Printing volumes of both viewbooks and magazines would have been a better suited dataset to make correlations between the paper being consumed for viewbooks and magazines, and the enrolment rates during the stated time periods. Assuming a portion “paper, brochure, glossy, 11x17”, was used to assemble viewbooks,
correlation may exist between reduced output of paper between 2019 and 2020, and reduced enrolment rates. This argument can be made on the basis that viewbooks can be viewed as a tool to promote institutional excellence, thus enticing more students to matriculate at said college or university (Hartley & Morphew, 2008). Based on this information it can be inferred that a reduction in paper procurement, and therefore production of viewbooks may have reduced students’ exposure to these marketing tools during the 2020 period. Based on the enrolment report, this may have been a cause for a reduction in both enrolment rates and student’s selection as Queen’s University as their top-ranking for choice of post-secondary institution.

Using this data, similar comparisons may be drawn in respect to financial outcomes. The key objective of alumni magazines is to secure donations from alumni of the university. Using the Consolidated Statement of Operations produced by Queen’s University Financial Services, a decrease in the total value of donations between the 2019-2020 and 2020-2021 periods can be observed (See Appendix E). Thus, this preliminary dataset may be used to infer that a reduction in the output of alumni review magazines may have been a cause for the eight-thousand dollar decrease in donations between the 2019-2020 and 2020-2021 periods.

Regarding sustainability outcomes, without quantitative data, the answers provided in the semi-structured interview provide the allusion that proper disposal of both viewbooks and QAR (into recycling streams) provide an ecologically friendly approach to end-of-life management. What this interview failed to provide were the values related to carbon emissions and greenhouse gases expended throughout the recycling process. The representative from the City of Kingston noted that the first step in the recycling process is the collection and transportation of blue box materials. To transport these materials to KARC requires the use of curbside pickup trucks. MSW vehicles are considered heavy-duty diesel vehicles (Agar et al., 2007). These types have
Transportation remains a key factor throughout end-of-life management process, regardless of a viewbook or QAR being destined for recycling or landfill. If the viewbook or magazine satisfies the material security index and/or monetary value required by the City of Kingston, the interview respondent stated, such material “bailed and shipped off for processing”. Although the material is sorted within city borders, the City of Kingston currently does not possess the infrastructure needed to divert these recyclable materials from landfill (Hird, 2021). Therefore, 100 per cent of paper selected for recycling at KARC is shipped outside the city (Hird, 2021). Consequently, this requires the expenditure of more carbon emissions and other greenhouse gases by heavy-duty diesel vehicles.

The interview respondent also provided information on paper materials too contaminated to be considered eligible for recycling. Recall, it was stated that viewbooks and magazines which do not meet the standard for paper recycling in Kingston will be sent to landfill. Again, this process results in immense CO₂ emissions, due to the potentially large distances travelled by waste. In 2010, Kingston’s landfill reached capacity and was closed to the public (Hird et al., 2014). In consequence, viewbooks and copies of QAR can in some instances be transported hundreds of kilometres. A common landfill destination used by waste contractors in the City of Kingston is Moose Creek, located nearly 200km away from Kingston’s city borders (Hird et al., 2014). Using the figure noted above, the transportation of one heavy-duty diesel vehicle (originating in Kingston) would emit 1200 times as much greenhouse gas in a one-way trip to Moose Creek, as opposed to a large family sport utility vehicle travelling the same distance.
The environmental implications of these paper products display concerns in relation to climate change factors such as greenhouse gas emissions. However, online versions of these products do not come without their own impacts. For instance, to access the Queen’s Admission viewbook online, one can simply download the digital PDF through Queen’s University’s webpage. Take the 2022 viewbook as an example. Queen’s University notes the amount of data required to access the PDF file for this document as 15 mega-bytes (MB) (Queen’s University, 2022). To access the internet requires the consumption of electricity, and therefore, greenhouse gases. Studies have been conducted in Belgium estimating how much energy is required to conduct certain activities on the internet. It is noted that during its lifecycle, a 1MB email emits 20g of CO$_2$ (Energuide, 2021). This expenditure is equivalent to using a 60-watt lamp for 25 minutes (Energuide, 2021). Using this figure, it can be estimated that to download one copy of the 15MB 2022 Admission viewbook, requires the emission of 300g of CO$_2$.

Admissions viewbooks were chosen for this study because of their applicability, availability, and persistence of use over time at Queen’s University. Similarly, the QAR has been continuously published for 95 years, thus, allowing for the analysis of trends over an extensive period. Through investigation it was found digital copies of both viewbooks, and QAR have been transferred to websites operated by Queen’s University. This allowed for analysis of trends such as the differences in page length and marketing styles of the publications. However, the World Wide Web has only been publicly available since 1993 (Davidson, 2015). As such, access to data beyond this point was difficult to obtain, thus reducing the range of time for which analysis could be conducted of both viewbooks and QAR. Second, if more time had been allotted to the study it would have been useful to analyze more of Queen’s University’s printing volumes for documents outside of viewbooks and QAR. Queen’s University produces an extensive range of
recruitment documents including but not limited to the Queen’s Gazette, Smith Magazine, Queen’s Law Viewbook, and (e)Affect (Queen’s University, 2022). As these products are also branded by Queen’s University, they must also be reported to Stewardship Ontario as per O. Reg 391/21 beginning 2022.

Another issue with this project was the geographic range for which it was conducted. Recall, viewbooks and QAR are used as recruitment tools for prospective undergraduate students and alumni. As such, these documents are produced and distributed in Kingston for the purposes of on-campus recruitment (i.e during campus tours), or through events such as Ontario Universities’ Fair. However, according to the 2020-2021 Queen’s University Enrolment Report, Queen’s University consisted of a total 3576 international undergraduate and graduate students for the 2020-2021 period. These students represented 79 countries, with the top three nations (based on enrolment) being China, followed by India, and third, the United States (Queen’s University Office of Provost, 2020). So, while many of these documents are disposed of on Queen’s University campus and in the Kingston community, it must also be considered that these tools are in some cases mailed directly to students in various cities and nations (Brelan et al., 2000). The distances travelled by these products in the mailing process further contribute to their ecological footprint. For instance, in the United States, postage accounts for 0.6 percent of US national greenhouse gases (Crew, 2010). On a unit basis, periodicals (such as magazines) have the highest pollutant emissions due to their relatively high weight (Crew, 2010). Therefore, a higher page count of both viewbooks and magazines is proportional to an increase in greenhouse gas emissions, in the case that these products are mailed to students and alumni.

Continually, the environmental implication of these documents and the ways in which they are managed at the end-of-life, will vary depending on the city in which they are disposed.
As found through the semi-structured interview with Kingston’s Solid Waste Services, the City of Kingston has a unique paper recycling process which aligns with Ontario’s Blue Box program. Viewbooks and QAR are favourable for Kingston’s recycling program due to their material security index, and monetary value within the context of Ontario and its economic markets. In contrast, a nation such as the United States will manage paper waste in an array of formats. As such, these management strategies will also result in different environmental implications. The Environmental Protection Agency notes, in the United States, recycling infrastructure has not kept pace with today’s waste stream and domestic markets for recycled materials need to be strengthened (Environmental Protection Agency, 2021). Therefore, there is a greater likelihood that material such as viewbooks and QAR would arrive at landfill in a country such as the United States, where attributes such as material security index and monetary value (of these paper products) is considered less than that of those variables in the context of Kingston ON.

Analyzing only the objectives of O. Reg 391/21, one would recommend Queen’s University shift to a purely virtual distribution of viewbooks and QAR. However, the results from this project indicate that such actions could demonstrate correlation resulting in reduced enrolments rates and donations. This project also examined the drawbacks of paper recycling despite claims of success surrounding recycling and Ontario’s Blue Box Program. Similarly, it was observed that a virtual distribution of these documents also produces its own environmental consequences. Therefore, a condensed format of the viewbook, and QAR should continue to be printed, but in lower volumes. The analysis of page lengths of these documents over time did not reveal any significant trends. It may however be noted that in the years where page lengths of these documents were lowered, (i.e., the 2019 viewbook), statistics such as undergraduate
enrolment rate or ranking of Queen’s University as a student’s top choice remained high. This is in comparison to years (i.e., 2020) where viewbooks page length was higher. Reducing the length of these documents would reduce the total ‘paper materials’ output by Queen’s University, allowing the institution to perform better under O. Reg 391/21, and display enhanced IPR. At the same time, this form of distribution would allow the University to continue operating under its current structure, hopefully causing minimal disruption to enrolment rates and donations. Although the online format of these documents can also contribute to CO₂ emissions, they offer an alternative with less environmental consequences which are observed in the paper recycling process. Thus, it may also be suggested that the university continue to offer these documents online.
References


Queen’s University. (2022). *About Us / Masthead*. Queen's Gazette | Queen's University. Retrieved from https://www.queensu.ca/gazette/alumnireview/about-us-masthead

Queen's University. (2022). *Queen's University*. Viewbooks & Publications | Queen's University. Retrieved from https://www.queensu.ca/about/publications


Appendix A

Outline of persons and/or institutions considered a producer of paper products and packaging-like products under RPRA legislation.

For paper products and packaging-like products, a person is considered a producer:

- if they are the brand holder of the paper product or packaging-like product and are resident in Canada
- if no resident brand holder, they are resident in Ontario and import the paper product or packaging-like product
- if no resident importer, they are the retailer that supplied the paper product or packaging-like product directly to consumers in Ontario
- if the retailer who would be the producer is a marketplace seller, the marketplace facilitator is the obligated producer
- if the producer is a business that is a franchise, the franchisor is the obligated producer, if that franchisor has franchisees that are resident in Ontario

Part two of O. Reg 391/21 outlining the person who is the producer of the paper products or packaging-like products shall be determined in accordance with three rules.

**PART II**
**DETERMINATION OF THE PRODUCER**

Application
8. This Part only applies to blue box packaging, paper products and packaging-like products that are blue box material.

Producer, blue box packaging
9. (1) Where blue box packaging for a product is supplied in Ontario to a consumer, the producer of that blue box packaging shall be determined in accordance with the following rules:

1. For the portion of the blue box packaging of a product that a brand holder added to the product, the producer is,
   i. the brand holder of the product, if the brand holder is resident in Canada,
   ii. if there is no person described in subparagraph i, the importer of the product, if the importer is resident in Ontario, or
   iii. if there is no person described in subparagraph i or ii, the retailer who supplied the product to the consumer.

2. For the portion of the blue box packaging of a product that an importer of the product into Ontario added to the product, the producer is,
   i. the importer of the product into Ontario, if the importer is a person who is resident in Ontario, or
   ii. if there is no person described in subparagraph i, the retailer who supplied the product to the consumer.

3. For any portion of the blue box packaging not described in paragraph 1 or 2, the producer is the retailer who supplied the product to the consumer.

Appendix C
Poster published by Sustainable Queen’s, regarding mixed paper sorting recommendations on the university campus.
Appendix D
Semi-Structured Interview Guide

The following questions will be used as a guide when interviewing Solid Waste Services at the City of Kingston. The exact wording and questions will vary depending on the responses of the participant(s).

- What are the typical steps in the paper recycling process at this facility?
- Prior to diverting paper commodities from waste flows destined for landfill, is there a valuation/hierarchy used to select paper products for recycling streams? (i.e., are certain products prioritized for recycling based on their composition/materials?)
- Are there any unique processes at this facility involving paper recycling?
- Are there any processes at this facility to help prevent or mitigate the environmental impact of both recycling and landfilling products delivered to your facility?
- What kind of volumes of paper waste does this facility receive?
- Based on the known procedures at your facility, do you believe admission’s viewbooks and alumni review magazines can be diverted from landfill into recycling streams?
Appendix E

Consolidated Statement of Operations by Fund at Queen’s University for the 2019-2020 and 2020-2021 periods.

### THE CONSOLIDATED STATEMENT OF OPERATIONS BY FUND
April 30, 2020
(Thousands of Dollars)

<table>
<thead>
<tr>
<th></th>
<th>Operating</th>
<th>Ancillaries</th>
<th>Trust and Endowment</th>
<th>Research</th>
<th>Capital</th>
<th>Consolidated Library</th>
<th>Fund 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>REVENUE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grants and contracts</td>
<td>219,281</td>
<td>-</td>
<td>15,886</td>
<td>174,408</td>
<td>(1,097)</td>
<td>-</td>
<td>49,780</td>
</tr>
<tr>
<td>Student fees</td>
<td>292,281</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4,222</td>
<td>296,503</td>
</tr>
<tr>
<td>Salaries and wages</td>
<td>-</td>
<td>7,405</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3,172</td>
<td>9,577</td>
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<tr>
<td>Rental income</td>
<td>11,679</td>
<td>-</td>
<td>22,079</td>
<td>1,579</td>
<td>-</td>
<td>15,858</td>
<td>232</td>
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<tr>
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<td>-</td>
<td>-</td>
<td>23,819</td>
<td>263</td>
<td>-</td>
<td>23,819</td>
<td>-</td>
</tr>
<tr>
<td>Other</td>
<td>-</td>
<td>-</td>
<td>942</td>
<td>541</td>
<td>-</td>
<td>25</td>
<td>122,557</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>EXPENSES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salaries and benefits</td>
<td>416,956</td>
<td>11,115</td>
<td>18,209</td>
<td>71,134</td>
<td>-</td>
<td>-</td>
<td>5,052</td>
</tr>
<tr>
<td>Depreciation and amortization</td>
<td>12,661</td>
<td>4,473</td>
<td>9,760</td>
<td>65,108</td>
<td>1,274</td>
<td>9,927</td>
<td>178,249</td>
</tr>
<tr>
<td>Employee-related services</td>
<td>13,661</td>
<td>22,227</td>
<td>1,551</td>
<td>53,940</td>
<td>-</td>
<td>55</td>
<td>6,228</td>
</tr>
<tr>
<td>Student services</td>
<td>40,158</td>
<td>-</td>
<td>7,226</td>
<td>416</td>
<td>-</td>
<td>-</td>
<td>48,930</td>
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<tr>
<td>Acquisition of capital assets</td>
<td>4,654</td>
<td>-</td>
<td>-</td>
<td>44,840</td>
<td>3,751</td>
<td>44,857</td>
<td>49,577</td>
</tr>
<tr>
<td>Reservations and allocations</td>
<td>9,001</td>
<td>9,142</td>
<td>420</td>
<td>767</td>
<td>12,285</td>
<td>(116)</td>
<td>21,149</td>
</tr>
<tr>
<td>Travel and reunions</td>
<td>19,152</td>
<td>245</td>
<td>1,655</td>
<td>8,946</td>
<td>-</td>
<td>-</td>
<td>101</td>
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<td>Utilities, taxes, and insurance</td>
<td>8,278</td>
<td>-</td>
<td>123</td>
<td>126</td>
<td>-</td>
<td>858</td>
<td>16,585</td>
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<tr>
<td>Interest on long-term debt</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>72,690</td>
<td>15,162</td>
<td>143,657</td>
<td>29,434</td>
<td>-</td>
<td>5,768</td>
<td>113,905</td>
</tr>
<tr>
<td><strong>Excess (deficiency) of revenues over expenses</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

The table below presents the activities of the University by fund, for the year ended April 30, 2020, and supplements the information presented in the financial statements.

### THE CONSOLIDATED STATEMENT OF OPERATIONS BY FUND
April 30, 2021
(Thousands of Dollars)

<table>
<thead>
<tr>
<th></th>
<th>Operating</th>
<th>Ancillaries</th>
<th>Trust and Endowment</th>
<th>Research</th>
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<th>Consolidated Library</th>
<th>Fund 2021</th>
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<td><strong>REVENUE</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grants and contracts</td>
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<td>179,216</td>
<td>(2,007)</td>
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<td>Student fees</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>4,265</td>
<td>298,029</td>
</tr>
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<td>Salaries and wages</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>402,762</td>
<td>-</td>
</tr>
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<td>Investment income</td>
<td>90,964</td>
<td>-</td>
<td>69,207</td>
<td>(4,052)</td>
<td>-</td>
<td>-</td>
<td>161,177</td>
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<td>Sales of services and products</td>
<td>4,990</td>
<td>97,809</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2,962</td>
<td>45,512</td>
</tr>
<tr>
<td>Annocation of deferred capital contributions</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>23,579</td>
<td>293</td>
<td>29,872</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>-</td>
<td>-</td>
<td>2,685</td>
<td>108</td>
<td>-</td>
<td>-</td>
<td>16,322</td>
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<tr>
<td><strong>Total</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>EXPENSES</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salaries and benefits</td>
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<td>6,890</td>
<td>16,798</td>
<td>40,639</td>
<td>4,510</td>
<td>14,904</td>
<td>597,825</td>
</tr>
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<td>44,063</td>
<td>(12,025)</td>
<td>105</td>
<td>158,144</td>
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<tr>
<td>Student services</td>
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<td>20,611</td>
<td>15,257</td>
<td>-</td>
<td>-</td>
<td>85,589</td>
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<td>Maintenance and repairs</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Annocation of capital assets</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Reservations and allocations</td>
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<td>-</td>
<td>785</td>
<td>16,535</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>17,021</td>
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<td>Travel and reunions</td>
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<td>237</td>
<td>767</td>
<td>-</td>
<td>-</td>
<td>1,913</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td><strong>Total</strong></td>
<td>73,353</td>
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<td>13,532</td>
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<td>6,365</td>
<td>106,865</td>
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<td><strong>Excess (deficiency) of revenues over expenses</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

The table below presents the activities of the University by fund, for the year ended April 30, 2021, and supplements the information presented in the financial statements.

### Financial Statements
Year ended April 30, 2020
Queen’s University at Kingston

### Financial Statements
Year ended April 30, 2021
Queen’s University at Kingston

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