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Study of Managing and Developing Procedures to Calculate the Retail Packaging Waste in New Zealand.

**A thesis presented in fulfilment for the degree of:
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Abstract

The purpose of completing this research is to develop a system that will estimate the total volume of retail packaging in our waste streams. The research also outlines the procedures that are required in order to complete the project in future years. The objectives of the project were to complete a thorough investigation into the following fields of literature; Packaging Fundamentals, Sampling Statistics, Regression Analysis and project management to assist in developing a sound methodology to collect data.

Woolworths, Pak N Save, The Warehouse and Liquor King stores were used, as it was believed that these stores would most fairly represent the retail market. The Warehouse in general merchandise, the 2 grocery stores as the food market and the bottle store as one of the foremost users of packaging innovation in the retail market.

The largest step of this project was collecting the data. Unfortunately not each piece of retail packaging can be assessed so this project was implemented to rationalise this sample to an accurate and reliable representation of the retail market. Then using a simple net gross weight methodology assess a proportion of the packages to develop conversion equations. Once the conversion equations were developed then these could be applied to all the packages. Secondary Packaging was also assessed but using a slightly different process that investigated the recycling of cardboard from all the stores.

This information can then be extrapolated up to represent the complete and entire retail market. This was done on a market share basis. For example Woolworths represent 30% of New Zealand's grocery market. Therefore the weight and volume of packaging from that store could be extrapolated up to represent the complete grocery market.

From this, a procedures manual and a future plan was outlined in order to maintain up to date information.

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Chapter 1. Introduction and Background

1.1. Background: Packaging Council of New Zealand Inc.

The Council was formed in 1992 at the request of Government and has, in the last nine years, established a good working relationship with the Ministry for the Environment and other Government sectors. The Council strives to ensure that the New Zealand packaged goods industry addresses, on a voluntary basis, those issues relating to packaging usage and waste which have, in many other countries, resulted in legislative actions with costs to both producers and consumers.

In 1996, the Council was successful in establishing an ACCORD with Government on behalf of industry aimed at minimising the adverse environmental effects of unwanted packaging. This is a voluntary process which the majority of major manufacturers and fillers of packaging have supported and was reached after research into the role of packaging in the New Zealand waste stream and a subsequent negotiation with Government.

The Council's ongoing work is to monitor the role of waste packaging in the New Zealand waste stream, ensure that the volume remains at an acceptable level minimising the need for restrictive legislation.

Fundamental to the work of the Council is the establishment of a nation-wide education programme that puts into perspective the role of packaging in a modern society. The Council's research has established that packaging is less than 12% of the municipal waste stream and it is clear that the spoilage prevented by the use of appropriate packaging is greater than the waste packaging created once it is no longer required (New Zealand Packaging Council Website, 2001). The Council recognises that to be successful the role of packaging must be promoted and in perspective. To this end it has worked in concert with Central and Local Government in the production of appropriate educational material.

The current membership of the Council continues to increase with most major companies involved in packaging participating. The Council has an ongoing membership drive to more extensively meet its and Central Governments objectives with greater national involvement.

Of primary importance is the ongoing research carried out to accurately establish the incidence of indirect imported packaging on the New Zealand retail shelves and the establishment of an Awards programme for Environmentally Acceptable Packaging.

On a regular basis the Council conducts mass balances, including recovery rates, for the five principal material types used in packaging and also monitors the light-weighting and down-gauging of packaging materials.

The Council personnel also conduct lectures and prepare articles for the media.

The Packaging Council's main objectives are to:

- represent manufacturers, fillers, wholesalers, retailers and consumers of packaging
- provide a holistic approach to the issue of packaging waste
- keep key players in government, industry and the community informed about packaging

The Council was set up to provide information about the environmental effects of packaged goods, waste packaging, and waste materials collection, recycling, reuse and residual management and to initiate voluntary action addressing the issue of packaging waste across the product chain from raw materials to retail sales.

As a key player in reporting and discussing packaging issues with the government the Packaging Council need regular updated information as to what the trends in packaging usage, not only from the manufacturers but from the end user and the stores that manage the products. Hence the Packaging Council need's reliable

information about the retail volume manufactured, consumed, recycled locally and also volumes that are imported from various countries.

The Packaging Council requires information on the exact quantity or proportion of imported packaging in the New Zealand retail sector. In 1998 students from Waikato Universities Marketing Department completed a project that measured the total volume of imported packaging in the New Zealand retail sector. Their solution was within 5% of the expected volume that was generated from manufacturers of packaging in New Zealand. However there was some concern raised over the volumes of specific materials. Some of the volumes for the various materials were over 20% out from what was predicted. (PCNZ 2000)

To ensure that their data was up to date the amount of imported retail packaging requires checking regularly.

1.2. Packaging Background

The most obvious benefit of packaging is to preserve and protect foodstuffs and all other consumer goods from damage and spoilage. Packaging also plays an important role in the containment of a product, the communication of information to the purchaser of the product and recently the convenience and performance of the product. One international study found that the loss of foodstuffs between grower and consumer is about two percent in the developed world and up to 33 percent in the developing world. The difference is largely due to incorrect or badly designed packaging. (PCNZ, 2000)

Packaging makes up less than 12 percent by weight of the New Zealand municipal waste stream. Recycling and lighter weight packaging have reduced potential packaging waste volumes by more than 40 percent over the past 12 years. (PCNZ, 2000)

There are many misconceptions about the amount of waste caused by packaging. This has been caused by, consumers creating informal data believing that package content

in the landfill is equivalent to the volume they dispose of in their rubbish bags. The informal and misleading data estimates this packaging waste to be 80-90%. (Robertson, 2001)

In actual fact, lightweight materials and improved designs have led to big reductions in the weight of product packages over the past 10 years. The Packaging Council estimates that the packaging industry has reduced the unit weight of packages by more than 20 percent in the past 12 years. (PCNZ, 2000)

1.3. Project Aim

To develop and use a sampling based system that will:

- Estimate the total volume of retail packaging in New Zealand based on a sample population of The Warehouse, Liquor King, Woolworths and Pak N Save.
- Estimate the percentage of packaging that is imported and what percentage is New Zealand made.
- Estimate the proportions of each of the following packaging materials:
 - Paperboard
 - Plastics
 - Glass
 - Steel or Tin
 - Aluminium

The system must include a procedure manual that guides future project operators through the following:

- Guides as to what information is required
- Steps to complete the data collection
- Steps involved in the conversion to weight process
- Steps involved in the data analysis
- A comprehensive list of conversion equations and conversion rates.

1.4. Objectives

The objectives of this project were to:

- Gain an understanding of the key elements of:
 - Project Management
 - Packaging Materials
 - Statistical Sampling and Statistical Analysis
- Put the understanding of project management into practise and develop a sound project plan
- Put the understanding of sampling and statistical information and develop a sampling methodology that will decrease the expense of financial and human resources
- Design conversion equations and/or conversion rates for all the packaging materials involved in the retail market
- Put the methodology and conversion rates designed into practice, continually analysis and improving them as the project progresses.
- Analyse the output of the process and conversion rates and present the results based on the aims of the project.
- Prepare a procedure manual that will clearly define the steps necessary to complete this project in subsequent years
- Present the information and the manual/s to the Packaging Council of New Zealand Inc.

1.5. Description of Main Areas of research

1.5.1. Project Management

In order for this project to be successful, an up to date and detailed understanding of project management was needed. This thesis looks at the introduction and description of these methods and then describes the way that the most suited tools were put into practise.

1.5.2. Packaging Materials

A detailed understanding of all the packaging materials was needed. This thesis looks into the materials that are most commonly used and how they can be sampled, identified and have their weights estimated. A brief investigation into packaging materials specific technologies and retail use is also explained.

1.5.3. Sampling and Statistical Interpretation

Sampling and statistical interpretation also played a large role in this thesis. Sampling methodologies, techniques, descriptive statistics and regression analysis are all researched and detailed in this report. A culmination of these areas of statistics was used to produce the required results set out in the aims of the project.

1.6. Summary

This chapter introduces the main areas of research of the thesis. This chapter also provides an insight into the role of the Packaging Council of New Zealand and the general role of packaging. The aims and objectives of this assignment are clearly defined. The remainder of the thesis is the research that took place in order to complete these aims and objectives.