Green initiatives in hospitals in Ontario: Is there a business case?

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Declaration

I, Julius Ueckermann, declare that the entire body of work contained in this research report is my own, original work; that I am the owner of the copyright hereof (unless explicitly stated otherwise); and that I have not previously submitted it, in its entirety or in part, for obtaining any other qualification.

J.H. Ueckermann 24 October 2011

Abstract

This study was conducted to investigate on what basis hospitals in Ontario could justify the capital and resource requirements needed to implement green initiatives. The study used two theoretical references as the basis for the literature review as well as for the interpretation of the results. The one reference used was a report released by the World Health Organization (WHO) and Health Care Without Harm (HCWH) in 2009, that addressed the responsibility of hospitals towards reducing greenhouse gas emissions. The second reference looked at a theoretical model that discussed four potential competitive environmental strategies that businesses can use to differentiate themselves based on green initiatives.

The literature review more specifically discussed the seven opportunities that were identified by the WHO and HCWH that hospitals can use to reduce their carbon footprint. These were: (1) energy efficiency; (2) built environment; (3) alternative energy; (4) transportation; (5) waste; (6) water; and (7) food. Each opportunity was discussed in detail and was evaluated in both a competitive and non-competitive environment. In addition, each opportunity was evaluated in light of its ability to be used in one of the competitive environmental sustainability strategies. In order to assess what the regulatory pressures are on Ontario hospitals, the Canadian Environmental Protection Act was evaluated. No major environmental legislative pressures on hospitals could be identified.

Another important part of the literature review was the evaluation of the funding model for Ontario hospitals. It was seen, that hospitals in Ontario received around 85 percent of their funding from the Ontario government and that hospitals and the ministry are both under financial pressure. This is an important indicator that funding to hospitals is very restricted.

The research data for this study was obtained through a survey that was conducted among hospital representatives who have already implemented some form of green initiatives. The results from 33 questionnaires indicated that hospitals primarily implemented green initiatives to obtain cost savings. In this regard, an eco-efficiency strategy would be a logical competitive strategy for Ontario hospitals to follow. This is a clear indication that green initiatives are seen more as a cost reduction tool than a direct attempt to reduce greenhouse gas emissions. Projects that are quick to implement, require low capital and have a quick payback, are favoured. The areas on which hospitals have focused, were energy efficiency, waste management and water savings. In general, it seems that most green initiative projects were still in an immature stage. Further results also showed that hospitals had no opportunity to increase revenue by making use of the benefits of green initiative projects. The research concluded that the only basis on which Ontario hospitals could justify the capital and resource required to implement green initiatives, were on a cost savings basis.

This report concludes with a discussion on the use of certain competitive strategies in a non-competitive environment before recommendations are made on how to improve the current

situation. The study concludes with shortcomings of this study and recommendations on further research to be done.

Key words:

Competitive environmental strategy

Environmental sustainability

Green initiatives

Green health care

Hospitals

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AHA	American Hospital Association
AHU	air handling unit
ASHE	American Society for Healthcare Engineering
Btu	British thermal unit
CCGHC	Canadian Coalition for Green Health Care
CEO	chief executive officer
CO_2	carbon dioxide
EIA	Energy Information Agency
EMS	environmental management systems
EPA	Environmental Protection Agency
FDA	Food and Drug Administration
GBCI	Green Building Certification Institute
GHG	greenhouse gas
GJ	gigajoules
HCWH	Health Care Without Harm
HFM	Health Facilities Management
HSC	Hospital for Sick Children (Toronto, Canada)
HVAC	heating, ventilation and air-conditioning
IEMA	Institute of Environmental Management and Assessment
IESO	Independent Electricity System Operator
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standards
IV	intravenous
LED	light-emitting diode
LEED	Leadership in Energy and Environmental Design
MOHLTC	Ministry of Health and Long-Term Care
MRI	magnetic resonance imaging
NHS	National Healthcare System (United Kingdom)
O. Reg.	Ontario Regulation
OHA	Ontario Hospital Association
PET	polyethylene terephthalate
PVC	polyvinyl chloride
RMW	regulated medical waste (also known as red bag waste)
UK	United Kingdom
US(A)	United States (of America)
UNFCCC	United Nations Framework Convention on Climate Change

USB	University of Stellenbosch Business School
USGBC	United States Green Building Council
WHA	World Health Assembly
WHO	World Health Organization

CHAPTER 1
ORIENTATION

1.1 INTRODUCTION

Different industries are using different strategies to address the need for becoming environmentally friendly, but some industries are inherently complex. This is particular true of the healthcare industry, and more specifically, hospitals. In 2009, the World Health Organization (WHO) and Health Care Without Harm (HCWH) published a discussion document (WHO & HCWH, 2009) to develop "programmes for health systems that will contribute to reducing their own greenhouse gas emissions". The document was based on recommendations from the World Health Assembly (2008), the WHO Executive Board Resolutions on Climate Change and Health (WHO, 2008a), and a 2008 World Heath Day (WHO, 2008b). These documents have clearly exerted pressure on hospitals to start the implementation of environmental-friendly initiatives. After all, hospitals will have to treat people whose health has been affected by global warming. There is therefore an even bigger expectation for these businesses to reduce their carbon footprint.

The WHO and HCWH discussion document identified three co-benefits for reducing the health sector's carbon footprint. Firstly, there are health co-benefits (WHO & HCWH, 2009: 6). This simply means that, if the global carbon footprint can be reduced, the effects of air pollution and water contamination will also reduce, resulting in a more healthy society. This in turn will reduce the pressure on the health system and will therefore improve the quality of medical services. Secondly, there are economic co-benefits (WHO & HCWH, 2009: 8). These benefits are based on savings that can be obtained on energy bills. One of the main contributors to high healthcare costs is the volatile energy prices. Thirdly, there are social co-benefits (WHO & HCWH, 2009: 9), which mean that healthcare workers can act as change agents in society and influence other parties positively.

As a further recommendation, the WHO and HCWH (2009: 23) identified seven opportunities for action by hospitals. These are:

i) Energy efficiency;
ii) Built environment;
iii) Alternative energy;
iv) Transportation;
v) Waste;
vi) Water;
vii) Food.

The underlying assumption is that many of these seven initiatives are easy and quick to implement, with almost immediate gains. One can argue that implementing energy efficiency initiatives can be considered as low-hanging fruit, but this is not true for many of the other initiatives. Many of these

initiatives would require a substantial investment from a resource and financial perspective. As an example, to build a new hospital that is environmentally friendly, that utilises natural light and other environmental resources to its maximum effect, can be up to 29 percent more expensive than constructing a traditional hospital (Lucuik, Trusty, Larsson & Charette, 2005: 23). To the same effect, to replace conventional electricity with wind generators or solar panels requires a huge capital investment. The same applies for the replacement of the motor fleet with hybrid or electric vehicles, acquiring new waste management systems, installing water purification plants to get rid of bottled water and sourcing food from local 'green' food producers.

In a private healthcare market like that of the United States of America (USA), hospitals have the ability to generate their own capital to invest in green initiatives (Scott, 2011). However, in a health system as operated in Canada and the United Kingdom (UK), this is not possible. All health care is funded publicly and hospitals are in a non-competitive environment. This raises the question, whether hospitals in this environment should invest in green initiatives. Are green initiatives simply to reduce costs or is there a real concern for the environment?

As mentioned previously, the Canadian province of Ontario, as with the rest of Canada, operates a national healthcare system. This means that all Canadian residents qualify for free hospital care. The Canadian government is therefore the only funder and the sole source of revenue for hospitals, with a small portion subsidised by private health insurance. In 2010, 63 percent of the total health expenditure was financed by the Ontario provincial government, 33 percent was financed by private health insurance (mainly outpatient expenses) and only three percent was financed by the federal government (Ontario Hospital Association, 2011a). It therefore seems that, because there is no conventional competition between hospitals in Canada to increase patient numbers, there is limited or no scope to increase revenue. This differs substantially from the hospital funding model in countries like the USA where fierce competition exists for patient numbers as a direct driver of revenue.

1.2 PROBLEM STATEMENT

Hospitals in Ontario have been under increased pressure to improve service and to reduce costs over the past number of years. In Canada, the inflationary costs of health care have been increasing well above normal inflation (Press, 2010; Ontario Ministry of Finance, 2010: 46). As a result, gaps have been appearing between the cost of healthcare delivery and the funding that is available. According to the Ontario Ministry of Finance (2010: 43), inflation and an increase in demand due to an aging population are the main drivers of healthcare costs. Currently, this report shows that 42 percent of the government of Ontario's total programme spending is on health care and the expectation is for it to increase to 50 percent in the near future. At the same time, the revenue stream remains constant. Partly because of the financial pressures, the Ontario Hospital Association (OHA) has launched an aggressive campaign for hospitals to implement green

initiatives in Ontario (OHA, 2011b). As a result, a number of hospitals in Ontario started to implement green initiatives, but it does raise the question whether there is a real business case.

As mentioned before, Ontario hospitals operate outside the conventional competitive environment and the market forces driving their revenue models are different to those of private hospitals. It is therefore important to understand what impact green initiatives will have on business strategy in this market, given the uniqueness of this environment. If the implementation of green initiatives can be justified in this market, the co-benefits identified by the WHO and HCWH (2009) will be realised and will have a positive impact on the health, economic and social domains.

The target audience chosen for this study included all hospitals in the province of Ontario, Canada. All hospitals are members of the Ontario Hospital Association (OHA). The following role players were identified:

- Ministry of Health and Long-Term Care;
- The Ontario Ministry of Finance;
- The Ontario Hospital Association (OHA);
- Ontario hospitals in Ontario, Canada;
- Hospital administrators and administration staff employed by Ontario hospitals; and
- The Canadian Coalition for Green Health Care.

1.2.1 The research question

The following research question was formulated for this study:
On what basis can hospitals in Ontario justify the capital and resource investment needed to implement various green initiatives?

This question was answered through investigation of the following sub-questions:

i) What is the extent of current green initiatives implemented in hospitals in Ontario?
ii) What business areas in hospitals are currently focusing on green initiatives?
iii) What is the primary motivation for implementing various green initiatives in hospitals?
iv) How strong are the external pressures to implement green initiatives?
v) What is the perceived return on investment of green initiatives?
vi) Is there a possibility to increase funding (revenue) to hospitals based on the implementation of green initiatives?

1.3 RESEARCH OBJECTIVES

The aim of this study was to understand whether there is a sound business case for implementing green initiatives in hospitals in Ontario. This study firstly looked at the current green initiatives already implemented by hospitals in Ontario, as well as the motivations behind them. It further investigated what the expected return on investment is for these initiatives from a pure business perspective. The study collated all available information to assess on what basis, if any, hospitals

in Ontario are currently justifying the implementation of green initiatives. The final objective was to conclude whether or not hospitals in Ontario could benefit from green initiatives in any way.

1.4 LITERATURE REVIEW

The awareness of global warming and climate change has a profound impact on modern day businesses. Businesses and corporations initially started to adopt environmental-friendly policies because it was required from a legal compliance perspective (Institute of Environmental Management and Assessment (IEMA), 2005). With the increase in awareness of global warming among the general public, both investors and consumers also started to demand that corporations invest even more heavily into environmental initiatives than what was required by law (Ervin & Casey, 2001). The international business community, especially in developed countries, adapted the term ‘going green’, or just ‘green’, to indicate how environmentally friendly they are. They also realised that, being green could give them a competitive advantage. A study conducted on 53 firms in the UK and Japan to investigate why companies go green, revealed that there are primarily three motivations: competitiveness, legitimation and environmental responsibility (Bansal & Roth, 2000). A further study by Lopez-Rodriguez (2009) revealed that there is a bigger weight on ecological concerns than on expected improvements in market performance. This raises the question, whether companies know what returns to expect when investing in environmental-sustainability initiatives and whether they can actually afford to invest in such initiatives. Investment in environmental-friendly processes can be costly.

This launched the debate that environmental regulations and competitiveness are not compatible. Porter and Van der Linde (1995) argued that, if companies are innovative to the level where it delivers a competitive advantage, the costs of becoming compliant to environmental regulation could be minimised. They further argued that a strong indicator of how competitive a particular industry is, depends on how it deals with environmental problems. Reinhardt (1998) agreed that there are opportunities for companies to get a return on investment from environmental initiatives, but warns that such investments should be done based on sound business and economical fundamentals. Reinhart (1998) further warned that, in some instances, investments into clean technology might not make any sense at all. As a result, many managers are left wondering if it is worth the effort getting involved in environmental issues, and if so, what to do first. With nearly 50 percent of the population in the USA and Canada not believing that global warming is a result of human intervention (Pelham, 2009), one cannot assume that return on investment can automatically be recovered from the consumer.

As a guideline to corporations, Orsato (2006) devised a framework to assist managers in critically assessing their motivations for adopting environmental-friendly initiatives. In his article, *Competitive Environmental Strategies: When does it pay to be Green?*, Orsato presented four generic competitive environmental strategies (Figure 1.1). These strategies are briefly discussed below.

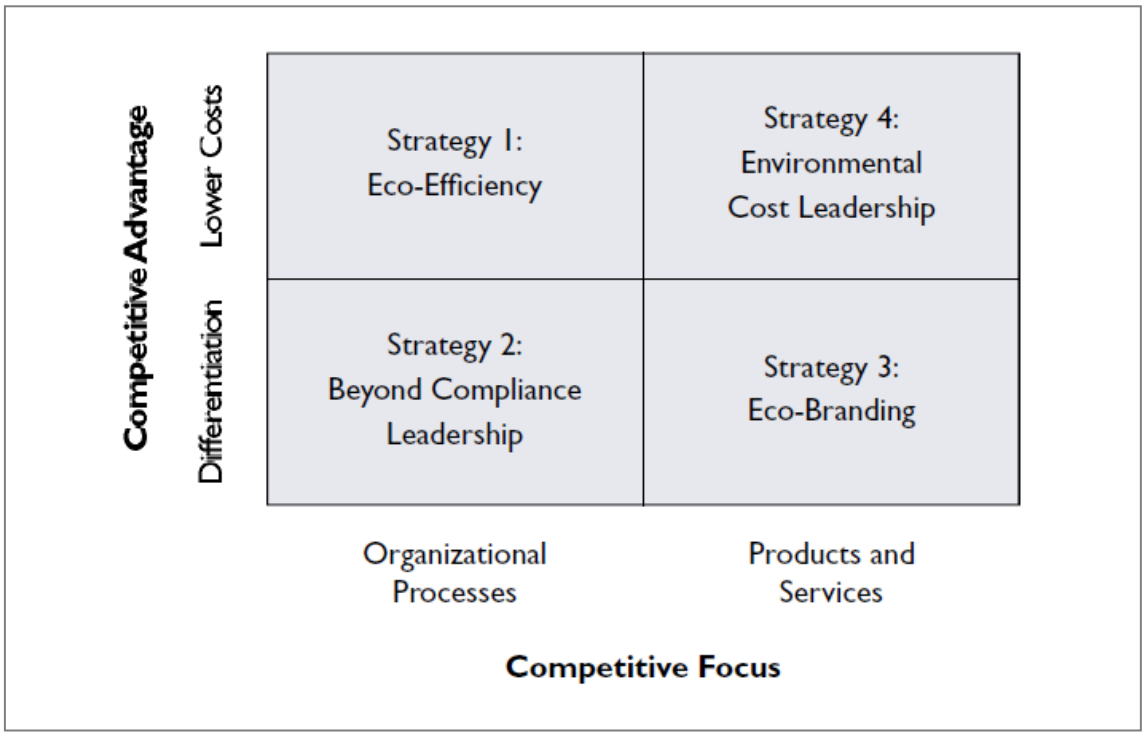


Figure 1.1: Generic competitive environmental strategies

Source: Orsato, 2006: 131.

1.4.1 The eco-efficiency strategy

Eco-efficiency can be used when a company needs to reduce cost as well as the environmental impact of its processes. A company can therefore increase its resource productivity by better utilising waste in the form of an increase in yields or a better utilisation of by-products (Porter & Van der Linde, 1995). Orsato (2006) is of the opinion that savings through eco-efficient strategies can be generated in virtually every company and will make business sense, especially in industries where it is unlikely that consumers will pay for environmental improvements.

For some companies, acknowledgement of their initiatives by the public is very important.

1.4.2 The beyond compliance leadership strategy

Beyond compliance leadership is a strategy for companies that believe that investing in environmental initiatives and publicising their efforts, will give them a competitive advantage. This can also be seen as a type of reputation insurance. To achieve this, firms may get their environmental management systems (EMS) certified according to the ISO 14 001 (Jackson, 2001) and even implement environmental improvements that may not be profitable. According to Orsato (2006), initiatives that go beyond compliance will eventually have an effect on consumer behaviour, especially if they have an effect on the image of the company.

1.4.3 The eco-branding strategy

Differentiation in the market using eco-branding requires the adherence to three pre-requisites. These are:

i) The consumer must be prepared to pay for the cost of a product that is ecologically differentiated;

ii) The consumer must have access to accurate information regarding the environmental performance of the product; and

iii) It must be difficult for a competitor to copy the differentiation (Orsato, 2006: 134).

Once these pre-requisites are met, this strategy is the most straightforward, but it is definitely not for all companies to follow.

While charging of a price premium for 'green' products is quite logic in an eco-branding strategy, trying to be a green product producer and a cost leader at the same time is much more complicated.

1.4.4 The environmental cost leadership strategy

Environmental cost leadership has an obvious challenge. Companies that want to follow this strategy have to produce eco-friendly products that can be competitive on both environmental performances as well as on price (Orsato, 2006: 135). In mature and saturated markets where industries are under pressure to reduce costs, adding a benefit like being green without increasing the costs, can be a very effective differentiation strategy.

1.4.5 The hospital industry and green initiatives

As noted earlier, the individual strategies discussed in Figure 1.1 are usually industry specific. As mentioned earlier, one industry that is under severe pressure to implement green initiatives as a result of the WHO and HCWI publications, is the healthcare industry, and more specifically, hospitals (WHO & HCWH, 2009). The global hospital industry can be divided into two main groups. The first group is privately-owned hospitals and associated services that are operating on a 'for-profit' or a 'not-for-profit' basis, known as 'Private Health Care' and that are funded privately. The second group is hospitals and associated services that are operating on a 'not-for-profit' basis, also known as 'Public Health Care' and that are funded by the government (Hanson & Berman, 1998).

Hanson and Berman (1998: 10) observed the drivers for growth in the healthcare environment within a country. They found that with a ten percent increase in income in a country, private physicians per million increased by 16 percent, while public physicians increased by only nine percent. They also found that, for the same increase in income of ten percent within a country, private hospital beds increased by 11 percent, while public hospital beds increased by only five percent. By looking at how these two distinct groups react to increases in income in a specific country, it is clear that the two groups are driven by completely different business strategies.

Based on available literature and reports, it is evident that both private hospitals (Practice Greenhealth, 2011) as well as public hospitals (Canadian Coalition for Green Health Care, 2011) have embarked on the implementation of green initiatives. When applying one of the four competitive advantage strategies as depicted in Figure 1.1, it seems that private hospitals could potentially use any of the four strategies. However, simply based on the funding model of public hospitals, it is quite evident that cost reduction through eco-efficiencies is very attractive. However, the question remains whether differentiation through different strategies is an option. A more detailed analysis of the different strategies in the various hospitals is discussed in Chapter 2.

1.5 CLARIFICATION OF KEY CONCEPTS

1.5.1 Global warming

'Global warming' is defined as a sustained and steady increase in the earth's atmospheric temperature. This change is great enough to change the earth's climate. Scientists uncovered that the earth has gone through a number of global warming episodes in its history, and is currently in such a phase. The current phase of global warming is blamed on the increased levels of greenhouse gases (GHG) (resulting from industrial and agricultural activities), resulting in a greenhouse effect. The potential long-term effects of global warming are severe weather changes, a rise in sea levels and fluctuations in rainfall and temperatures (The American Heritage Science Dictionary, 2002).

1.5.2 Environmental-friendly

Also known as 'eco-friendly', this concept refers to any law, policy, service or product that claims to do minimal harm to the environment. Some companies promote their products or services by claiming to be 'environmentally friendly' by using eco-labels. However, the International Organization for Standards (ISO) does not accept this standard as it is too vague to add any meaning to a product or service (GreenerChoices, 2011).

1.5.3 Green health care

Although there is no definition of 'green health care', the concept refers to environmentally-friendly health care. The concept is mainly used in hospitals where all components of healthcare delivery, including x-rays and other scans, medical waste, infection control, food, electricity utilisation and many others are utilised in such a way to minimise the impact on the environment.

1.5.4 Green initiatives

Green initiatives are generally referred to as activities or projects implemented by individuals or businesses to reduce the amount of greenhouse gases that are emitted by human activities. These initiatives can be targeted at large industrial processes, but also at small processes like driving a car or switching off lights when a room is not in use.

1.5.5 Greenhouse effect

The American Heritage Dictionary (2009) defines the 'greenhouse effect' as follows: "The phenomenon whereby the earth's atmosphere traps solar radiation, caused by the presence in the atmosphere of gases such as carbon dioxide, water vapour, and methane that allow incoming sunlight to pass through but absorb heat radiated back from the earth's surface". This absorption of heat in the earth's atmosphere causes global warming.

1.5.6 Greenhouse gases

Greenhouse gases (GHG) are atmospheric gases that cause the greenhouse effect (American Heritage Dictionary, 2009). These gases include water vapour, carbon dioxide, methane and nitrous oxide.

1.6 IMPORTANCE / BENEFITS OF THE STUDY

Most businesses today are operating in an environment driven by profit that is partly linked to the volume of sales or the volume of production. These businesses rely heavily on successful business strategies that in turn drive their sales and marketing efforts. The aim of a strategy is to analyse both the macro and micro-environment, to understand how competitors behave in this environment and to explore how to position products or services to maximise profit (Hough, Thompson, Strickland, Gamble, Human, Makin & Braxton, 2008). One of the offerings that a company can use as a competitive advantage, is selling green initiatives. However, there are businesses that operate outside of the conventional competitive arena. One such an example is hospitals in Canada. For businesses like these, the conventional rules of business may not count and it may be much harder for these businesses to implement green strategies. By assessing on what basis hospitals in Ontario can justify the implementation of green initiatives, this study determined whether conventional green strategies could be applied to this environment as well. The outcome of the result is important to companies operating in a similar environment to understand the similarities or differences to conventional green business strategies to a normal competitive environment.

1.7 RESEARCH DESIGN AND METHODOLOGY

This study made use of questionnaires that were completed by operations managers or people with similar designations in hospitals in Ontario. The questionnaire was designed to allow for both qualitative and quantitative data analyses and assessed the status and motivation for green initiatives in hospitals.

1.7.1 Sampling

The population for this study was all hospitals in Ontario, Canada, that have implemented green initiatives in some form. To sample this population, information was obtained from the OHA and the Canadian Coalition of Green Health Care to determine the size of the population and to identify the

hospitals to be sampled. Targeted hospitals were approached either directly or through the OHA and the Canadian Coalition of Green Health Care.

1.7.2 Questionnaire design and data collection

The questionnaire was designed to measure a range of responses that are related to the reasons for implementing green initiatives in a specific hospital. It was available in both paper format and electronic format. The electronic format was hosted by www.surveymonkey.com. The results from the manual surveys were manually recorded on a work sheet, while the responses from the electronic version were downloaded from the website. The data was combined for the data analysis.

1.7.3 Data analysis

The data from the surveys was analysed as follows:

- Qualitative analyses and interpretation of all qualitative data submitted in the questionaires;
- Quantitative statistical analysis to identify statistically significant trends;
- Regressions analysis to determine dependencies between various responses.

1.8 CHAPTER OUTLINE

This research report is divided into five chapters. A brief summary of the headings and content of each chapter is given below.

i) Chapter 1: Orientation

ii) Chapter 2: Green initiatives in hospitals

Chapter 2 is a literature review of existing green initiatives in the hospital industry in North America. The various accreditations and legislative drivers for environmental initiatives are discussed, as well as the commercial forces driving them. Attention is given to initiatives in hospitals in the USA and Canada, exploring the strategies and drivers for implementing green initiatives. The chapter concludes with a look at the various regulations applicable to hospitals in Ontario.

iii) Chapter 3: Hospital funding in Ontario

This chapter discusses the differences between the healthcare systems in Canada and the private healthcare system as operated in the USA. It looks at the healthcare funding model in the Ontario healthcare system and identifies the pressure points in the province. It describes the financial models being used in hospitals and highlights the need for hospitals in Ontario to not only increase service delivery, but also to cut costs at the same time. It also reviews existing cost-saving and revenue-generating initiatives in hospitals in Ontario.

iv) Chapter 4: Research methodology

This chapter reviews the research methodology applied in this study. It looks at the ability of the research study to answer the research question. The chapter reviews the theory of a properly-designed questionnaire with the focus on the selection of questions and the measurability of the results. Lastly, it reviews the sample selection process and the processing of the data.

v) Chapter 5: Results and findings

Chapter 5 focuses on the analysis of the data collected from the surveys. Focusing on the research objective, the data is presented in such a format that it is representative of the populations surveyed. The data is interpreted and summarised in graphic format and explained in light of the research questions.

vi) Chapter 6: Summary, conclusion and recommendations

Chapter 6 summarises the findings and concludes with the answering of the research question. It further identifies potential shortcomings in the study and ends with recommendations for future research.

1.9 CONCLUSION

This chapter gave an outline of the research project and touched on the different competitive environmental strategies that were published by Orsato (2006). The research question was formulated in such a way that it not only questions the reasons why hospitals in Ontario are implementing green initiatives, but also questions whether one of the four competitive environmental strategies (Figure 1.1) can be applied to hospitals in Ontario.

The following chapter offers a literature review of existing green initiatives in the hospital industry in North America.

CHAPTER 2
GREEN INITIATIVES IN HOSPITALS

2.1 INTRODUCTION

The first recorded scientific mentioning of global warming was done by Joseph Fourier as far back as 1824 (Weart, 2011). Fourier recognised that part of the heat radiated into the earth's atmosphere is being trapped. Since then, the scientific community, like the Intergovernmental Panel on Climate Change (IPCC), has been researching the phenomenon of global warming and the concept of greenhouse gas (GHG) and its effects on climate change was established over a period of nearly two millennia (United Nations, 2011).

It was not until the mid-1990s, that the concepts of greenhouse gasses, global warming and climate change started to make headlines around the world. Initiatives like the United Nations Framework Convention on Climate Control Change (UNFCCC) and the Kyoto Protocol was instrumental in increasing the awareness of global warming (Depledge, 2000). The main objective of the Kyoto Protocol was to put in place an international legal agreement where countries could sign up and commit themselves to reduce GHG emissions and therefore global warming. These countries were listed as 'Annex 1' countries in the protocol and committed to reduce GHG emissions by 5.2 percent as measured in 1990 in the period 2008 to 2012 (Depledge, 2000: 114, 47).

Regardless of the media exposure surrounding global warming, the public opinion on global warming remains divided. This is evident from the Gallop Polls that were conducted in 2007 and 2008 in a 127 countries (Pelham, 2009). These polls revealed than more than a third of the world's population are not aware or have never heard of the concept of global warming. It further revealed that, although there is a high awareness of global warming in developed countries, not everyone believes that global warming is a result of human intervention. In the USA, where 97 percent of the population reported knowledge of global warming, only 49 percent believed that it is a result of human activities. This is surprising taking into account that Al Gore, a former US vice-president, together with the United Nation's Intergovernmental Panel on Climate Change, received the Nobel Peace Prize in 2007 for their efforts in raising the awareness of global warming and how to slow it down (Nobel Foundation, 2007). Even in a country like Canada where 95 percent of the Canadian population had knowledge of global warming, only 61 percent believed it is a result of human activities (Pelham, 2009). This raises the question of how committed the general population is to reduce global warming. If half of the population in developed countries like the USA and Canada do not believe global warming is caused by human intervention, how successful will competitive environmental strategies be?

Referring back to the argument by Bansal and Roth (2000), companies mainly implement green strategies for three reasons: competitiveness, legitimation and environmental responsibility. If competitiveness plays a smaller role, either due to a low client uptake in a competitive environment, or if the company operates in a non-competitive environment, the only two reasons left are legitimation and environmental responsibility. This addresses three components of the research question under Section 1.2.1. Firstly, this information indicates that there may be strong external environmental pressures for the implementation of green initiatives in hospitals. Secondly, it suggests that there will be a high expectation on return on investment. Thirdly, it suggests that there is a strong moral motivation behind these motivations.

To understand the roles of each of these components in the hospital industry, the different green initiatives applicable to hospitals in the US and Canada are discussed below.

2.2 GREEN INITIATIVES AND THE HOSPITAL INDUSTRY

As already noted under Section 1.1, the WHO and HCWH discussion document identified seven areas where there are opportunities for hospitals to implement green initiatives (WHO & HCWH, 2009: 23). In an attempt to explore the extent and different approaches to the implementation of green initiatives in a competitive (US) and a non-competitive (Canadian) hospital environment, each of the seven areas is discussed separately. These initiatives are also evaluated against the competitive environmental strategy model as shown in Figure 1.1 as well as the research question.

2.2.1 Energy efficiency initiatives

According to the US Energy Information Administration (EIA) report published in 2009, hospitals in the US alone utilised 178 trillion British thermal units (Btu) of energy (EIA, 2010: 65). The EIA published data on the consumption by different energy sources in commercial buildings (Refer to Figure 2.1).

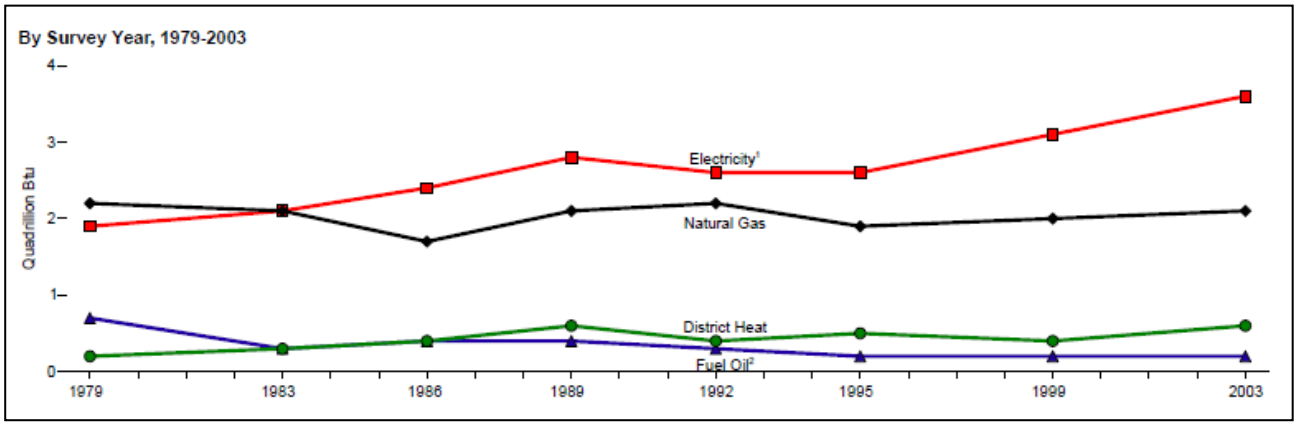


Figure 2.1: Commercial buildings' consumption by source

Source: EIA, 2010: 60.

It can clearly be seen from Figure 2.1 that the consumption of electricity is on a steady increase and together with natural gas, they are the main sources of energy in commercial buildings, which would include hospitals. If the electricity consumption is broken down further, specific areas where energy savings would be possible can clearly be identified. The top five areas that utilise electricity in commercial buildings are lighting, cooling, ventilation, refrigeration and space heating, as shown in Figure 2.2. Cooling and space heating will vary substantially between buildings based on their location, more specifically the climate in which they are located.

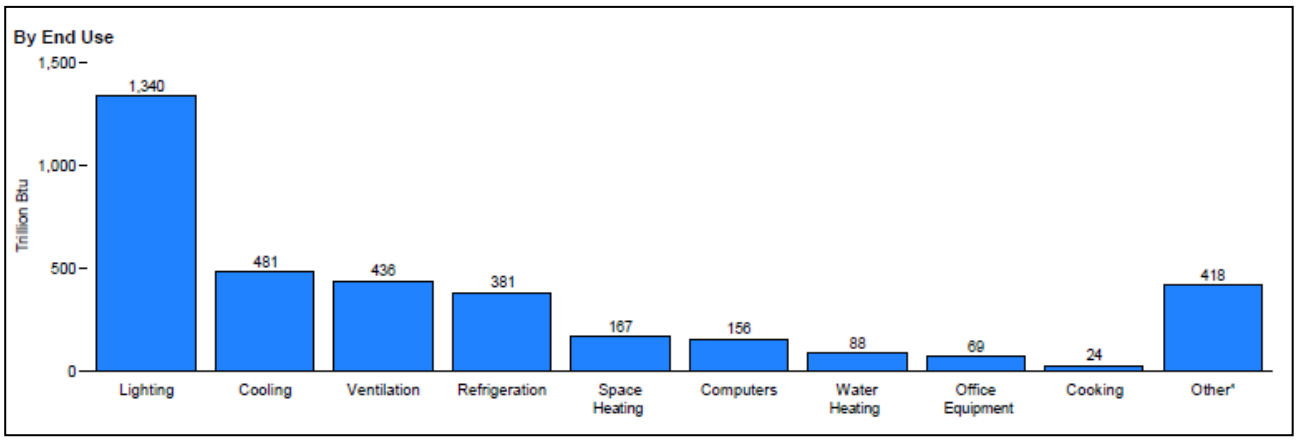


Figure 2.2: Commercial building electricity consumption by end use, 2003

Source: EIA, 2010: 64.

Hu, Chen and Chuah (2004) published a study that specifically looked at the energy consumption in a large hospital. In this study, it was found that air-conditioning was responsible for the biggest electricity end use, which was 52 percent of the total energy used by the building. This is not surprising when taken into account that this specific hospital is located in subtropical Taipei City in Taiwan. Hu *et al.* (2004) also looked at the electricity usage throughout the facility. These are shown in Figure 2.3.

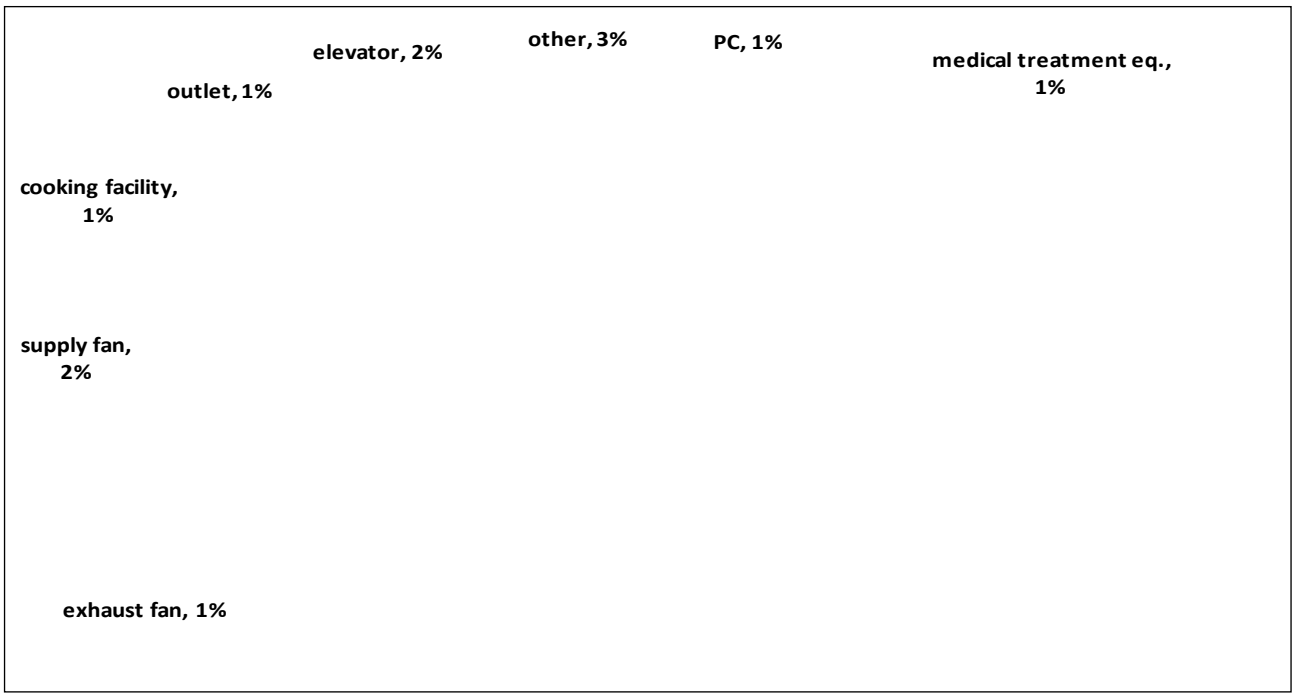


Figure 2.3: Electricity usage in a large hospital in Taipei

Source: Hu *et al*., 2004: 13.

Comparing the information in Figure 2.3 with that in Figure 2.2, one can see that a typical hospital's electricity utilisation profile is not much different from a conventional commercial building.

To understand better what type of energy saving initiatives hospitals in the USA are implementing, Health Facilities Management (HFM) and the American Society for Healthcare Engineering of the American Hospital Association randomly surveyed 691 hospital executives. The results of this survey were published in the *HFM Magazine* by Carpenter and Hoppszallern (2011). The results are summarised in Table 2.1.

From the survey results in Table 2.1, it is evident that initiatives that would require a substantial capital investment generally have a low uptake. A good example is the upgrading or replacement of conventional systems that was implemented in only seven percent of the cases, while something simple and relatively inexpensive like installing light-emitting diode (LED) signs at the hospital, was implemented in 75 percent of the cases. It is no surprise that hospitals also are feeling the pressures of the recent economical downturn in the USA. Delbert Reed, director of facilities engineering at Ben Taub Hospital in Houston, was quoted as saying that it was hard as an industry to convince their administrators to allocate funds for energy innovations rather than capital projects and medical equipment acquisitions (Carpenter & Hoppszallern, 2011: 22). Things that will generate revenue will always get the preference. Reed also noted that there is a lot of pressure on facilities in hospitals to reduce costs. This would require proper planning.

Table 2.1: Initiatives implemented to reduce energy costs

Energy reduction initiatives	Implemented in the last 24 months	Plan to implement in the next 24 months
Strategic energy master plan (e.g. 5 - 10 years or more)	25%	35%
Air handling unit: unoccupied control strategies and variable volume operation	47%	27%
Unoccupied period control (e.g. occupancy sensors) for lighting systems	51%	26%
Use of chiller/heater water source heat pumps	21%	11%
Commission or retro-commission buildings (audit to review performance)	29%	33%
Energy conservation program	49%	30%
Preventative maintenance program	88%	7%
Select energy-efficient products during equipment or appliance replacement	55%	21%
Upgrade building control and automation systems	53%	32%
Upgrade central heating/cooling systems	40%	32%
Upgrade distributed heating/cooling systems	35%	30%
Upgrade/replace conventional systems with cogeneration, fuel cells, solar systems	7%	14%
Photovoltaic harvesting system for low power, indoor devices	4%	11%
Increase efficiencies in building envelope (air sealing, insulation, cool roofs, windows	32%	29%
Transition to electronic ballast and energy-efficient lamps (T8 or T5)	76%	14%
Install LED exit signs	75%	12%
Install other LED lighting	40%	35%

Source: Carpenter and Hoppszallern, 2011: 18.

The energy efficiency initiatives discussed above is a clear indication that the emphasis in US hospitals is on reducing energy utilisation and therefore, costs. Looking at this information in view of the model presented by Orsato (2006), these initiatives can be applied under a number of generic competitive environmental strategies. The most obvious one is eco-efficiency. It is clear that hospitals need to reduce costs, but healthcare is an industry where clients would not be prepared to pay more for already expensive services simply because it is environmentally friendly. Surely, funders of health care, being health insurers, have only one aim in mind and that is to get the costs of health care as low as possible. This ties in with the Orsato's opinion that this strategy makes business sense especially in industries where it is unlikely that those consumers will pay for green initiatives.

Another strategy that could be applied when looking at Table 2.1, is the 'beyond compliance leadership' strategy. By publicising these efforts listed in Table 2.1, it would be possible for a

hospital to gain a competitive advantage over hospitals that do not publicise any of their energy efficiency efforts. In fact, eco-efficiency and 'beyond compliance leadership" can be very complementary to each other and it will make sense to combine the two.

It is still unclear from the literature whether hospitals implement energy savings initiatives simply to save costs or whether it is part of their strategic plan. Table 2.1 shows that only 25 percent of hospitals had a strategic energy master plan. What is not clear is whether this plan is included in the overall strategic plan of the hospital. Carpenter and Hoppszallern (2011: 22) also quoted Paul Lipke, who is the senior advisor for energy and buildings for an organisation called Health Care Without Harm (HCWH), saying that with their dealings with hospitals in the past, hospitals would rarely mention energy efficiency in their mission statements. However, recently hospitals like the Cleveland Clinic started to incorporate energy efficiency and clean energy as part of their commitment in caring for patients (Cleveland Clinic, 2011).

2.2.1.1 Energy-saving initiatives in Canada

A detailed survey on energy-saving initiatives among hospitals in Canada, similar to the one published by Carpenter and Hoppszallern (2011), does not exist. However, a document released by the OHA (2006: 27) showed that electricity represented about 50 percent of the total utility bill and about 23.7 percent of plant and maintenance costs in a hospital in Ontario. The most recent comparable information available is a report published by the Independent Electricity System Operator (IESO), (2010). In this report, 21 of the 155 hospitals in Ontario (14%) were interviewed. Replacing lighting has been the most common initiative by far (IESO, 2010: 13). By replacing the T12 lamps with T8 lamps, energy efficiency of up to 40 percent can be obtained, according to the manufacturer, Universal Lighting Technologies (2011). Other types of lighting upgrades included the installation of motion sensors and installing LED signs. This is in line with the data seen in the US hospitals in Table 2.1. These initiatives are easy and inexpensive to implement and can deliver immediate gains.

The second most common energy-saving initiative in Ontario hospitals involved the heating, ventilation and air-conditioning (HVAC) systems (IESO, 2010: 14). This is no surprise, given the fact that the temperature variations in Ontario are wide, ranging from extreme cold in the winter to extreme heat in the summer. It should be noted, that hospitals in the OHA (2006) report indicated that they have implemented or are planning to implement upgrades in this area. This can mean that the initiatives listed may be a wish list rather than actual implemented initiatives. Some of these initiatives are simple and inexpensive, like setting back the temperature on furnaces and boilers. Other initiatives, like modifications to air-handling units and replacement of chillers and furnaces, can be costly. As already seen from the data in Table 2.1, expensive initiatives can be a major barrier for the implementation of green initiatives.

There is a clear difference in the scope and intensity in the implementation of energy-efficient initiatives in Canada when compared to initiatives listed in the US in Table 2.1. It also means that

Canadian hospitals will find it much more difficult to incorporate Orsato's (2006) generic environmental strategies in their strategic plans. Other than the 'eco-efficiency strategy', which revolves around cost savings that are directly in line with energy efficiencies, competitive environmental strategies under a national healthcare system will be challenging to implement.

2.2.1.2 Barriers to the implementation of energy-saving initiatives in Ontario

Hospital staff interviewed in the IESO report also identified a number of barriers to implementing energy-saving initiatives (IESO, 2010: 18). These were:

i) The availability of money up front to pay for energy-saving upgrades. This is compounded by the current economical conditions in Ontario, meaning that since hospitals are funded by the government, they are not allowed to carry a deficit.
ii) Complexities around information and application processes for financial incentive programmes.
iii) Lack of available human resources and lack of available time were seen as major barriers.
iv) Inability to shift operations to off-peak times to load shift, due to requirements by staff and unions. Additional overtime that would have to be paid would offset the economic gains.
v) Insufficient time and knowledge on the hospital's side and an overall reliance on contractors and retailers to provide information.
vi) The reliance on short-term payback projects by some hospitals.
vii) Lack of corporate commitment to energy savings (noted for one hospital) is a major barrier.
viii) No steady baseline that can be used to accurately measure energy savings due to the constant adding and removing of equipment or redevelopment.
ix) The nature of hospital operations, being 24/7, makes implementation of energy-efficient projects very difficult to implement, especially with associated staffing constraints.

Two of the barriers listed that are closely related, are the availability of upfront capital and the expected payback period of the project. Of the hospitals interviewed, around 50 percent indicated that the payback period was very important when determining which projects should be implemented (IESO, 2010: 18). The most common acceptable payback period was three to five years, with a range of two to ten years. However, some hospitals indicated that only projects with payback periods of less than two years would be approved. Only one hospital indicated that other factors are also taken into consideration and that payback was becoming less important. These factors included environmental factors such as GHG emissions.

These results have a number of similarities to a survey done by the OHA in 2006 (OHA, 2006: 26). This OHA study revealed that 59 percent of the hospitals blamed the lack of staff resources as a factor that hinders energy conservation efforts, while 55 percent of the hospitals blamed the lack of funding. It is very evident from these two studies that the availability of funding is a major driver for the implementation of energy-saving initiatives in hospitals in Ontario, but will also be a problem for all other green initiatives.

This information has important implications when considering on what basis Ontario hospitals can justify capital and resource investments into green initiatives. This addresses an important point of the research question formulated under Section 1.2.1. If Ontario hospitals are struggling with the availability of both capital and human resources to implement energy-efficient initiatives, it will also have a serious consequence on the implementation of other green initiatives. The balance between the benefits of green initiatives, which seem to be more financially motivated than environmentally motivated, and the availability of funding, will be the key to success in this group of hospitals.

2.2.2 Built environment

The US Green Building Council (USGBC) developed the leading green building certification system, known as Leadership in Energy and Environmental Design (LEED), in 2000 (USGBC, 2011a). LEED is a third party accreditation system for buildings of all types and can be obtained worldwide. The LEED certification is done by the Green Building Certification Institute (GBCI) and validates the green features of a building. It also verifies that the green features that were designed for the building, are implemented and operating correctly. Accreditation is obtained through a points-based system that is awarded for specific building criteria.

In August 2011, the USGBC published the updated LEED guide for health care (USGBC, 2011b). It announced that points in health care can be earned in seven green building criteria. These are:

i) Sustainable sites;
ii) Water efficiency;
iii) Energy and atmosphere;
iv) Materials and resources;
v) Indoor environmental quality;
vi) Innovation in design; and
vii) Regional priority.

As a result, most healthcare facilities are either constructed or renovated with LEED certification in mind. However, there is a cost implication with LEED certification and green building design (Brick, 2003; Kats, 2003; The David and Lucile Packard Foundation, 2002). This can be one reason why hospital green-built initiatives have been struggling to gain momentum.

The construction of healthcare facilities in the US has been severely affected by the economical climate in the US from 2008 to 2011. The three factors responsible were the recession, the credit crisis and the controversial healthcare legislation of 2011.

Carpenter and Hoppszallern (2010) published an article based on the Health Facilities Management/American Society for Healthcare Engineering (ASHE) 2010 Construction Survey. This article highlighted a number of important findings from the survey:

- One in six hospitals stopped construction on a project in 2009, 36 percent said that they scaled back on projects in progress, and 32 percent decided not to proceed with projects not yet started.
- Renovations or expansions made out 74 percent of current or planned facilities projects, while only 16 percent were new hospitals and eleven percent were replacement facilities.
- Confirming the impact of the financial crisis, 49 percent of respondents indicated that they were using existing cash reserves to finance projects. This is an increase of eleven percent from the previous year.
- Fifty-three percent of respondents were evaluating the cost and benefit of incorporating green construction methods into projects. This means that if there is no cost benefit, no money will be allocated to these projects.

Carpenter and Hoppszallern (2010: 15) also quoted Dale Woodin, executive director of ASHE, saying that there is still a lot of concerns about whether it is necessary to spend money on green initiatives when money is tight. Woodin remarked, “Green and evidence-based design is often stuff that falls into the ‘wishes and wants’ category, and that can be what gets cut. But rooftop gardens, waterless urinals, some of those things – there’s a real discussion about whether they are really essential needs”.

This statement by Woodin clearly indicates that green initiatives, even in a private and competitive environment like the US, will come under pressure when funds are lacking or difficult to come by. In a financial survey conducted in 2009, 639 hospitals reported that their access to funds through the three most common routes is now nearly impossible (American Hospital Association (AHA), 2010: 3). These routes are philanthropic contributions, funding through tax-exempt bonds and bank loans. In another study conducted by McGraw-Hill Construction (2007), the general market was enthusiastic to increase the amount of green healthcare facilities projects in 2007. This was the feeling while money was still readily available for construction projects before the economic crisis. This study showed that in 2007, 19 percent of respondents expected their organisations to be significantly involved in green building the following year, representing a threefold increase from the previous year. A fifth of all the respondents expected to dedicate more that 30 percent of their projects building green healthcare facilities. The Construction Survey discussed above (Carpenter & Hoppszallern, 2010), strongly suggests that these projections never realised.

If the lack of funding and the scarcity of money had such a profound influence on the construction of green hospitals in the US, government funding of green hospital construction projects in Ontario would most likely not be at the top of the agenda. As an indication of the effect of the financial downturn on Canada, Figure 2.4 shows the decline from 2007 to 2009 in square feet of medical

buildings' construction. The 2009 figure shows a 52 percent decline in the number of square feet constructed compared to 2007.

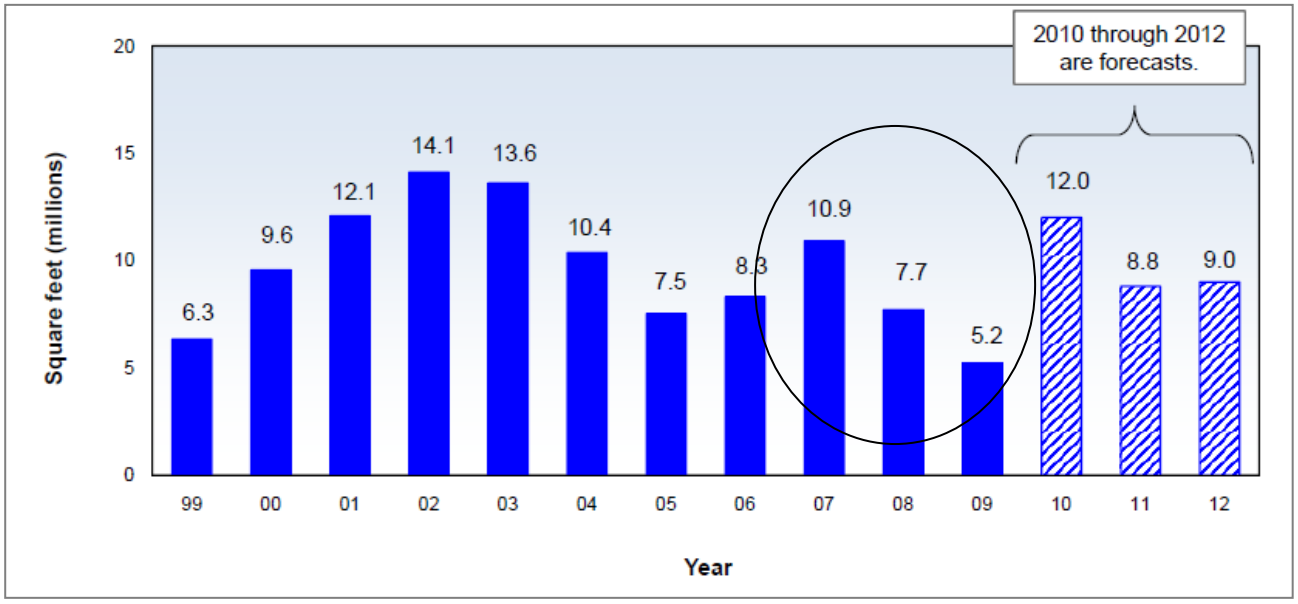


Figure 2.4: Commencement of Canadian medical buildings' construction

Source: CanaData, 2010: 40.

Even though Canada was less affected by the economic crisis than the US, Figure 2.4 clearly indicates a much reduced spend by the government on new medical building projects. The amount that the government would be prepared to spend on LEED certification and other green construction initiatives is debatable. The resistance towards green buildings will increase with an increase in required direct capital.

Brick (2003), expressed the view that there is a relatively high capital investment required to incorporate green initiatives in green building projects. Brick held the opinion that the main reason for people not to invest in green buildings is purely economic. However, Kats (2003) published a report for the Massachusetts Technology Collaborative that found that the average increase in building costs for green buildings varied from 0.6 percent to 6.5 percent, with an average of only two percent. Although these figures seem to be acceptable compared to possible expected returns, it is dependent on the number of green initiatives incorporated into a building. In a study published by The David and Lucile Packard Foundation (2002), this was very evident. This study looked at six scenarios, each with a different level of LEED certification. As baseline and classified as 'Market', was a conventional building with no green initiatives incorporated into the design. This was followed by 'LEED certified', 'LEED gold', 'LEED platinum' and 'Living Building' classifications. 'Living Building' was defined as a building that has no environmental impact on the environment over its life cycle. This study found that the increase in capital costs from baseline (Market), were 0.9 percent, 13 percent, 16 percent, 21 percent and 29 percent for the greener classifications

respectively. What is remarkable from this study is a reduction of 84 percent in calculated energy savings from the 'Market' to 'LEED platinum' building (The David and Lucile Packard Foundation, 2002: 28).

This may explain why so few hospitals in Ontario registered for LEED projects and why there is only one fully LEED-certified hospital in Canada (USGBC, 2011c). According to the public LEED project directory (Building, 2011), there are currently just two hospitals registered for LEED projects in Ontario, while there is only one silver certified LEED hospital in Canada. The facilities cannot be identified since they are classified as 'confidential' projects. However, Royal Jubilee Hospital on Vancouver Island is aiming to be the first acute care centre as well as the largest healthcare facility in Canada to obtain LEED gold status (Strashok, Dale, Herbert & Foon, 2010: 6).

Clearly, the government is very careful when it comes to investing in green healthcare buildings. From a hospital management perspective, this is a difficult situation to be in if you would need funds approved for any building-related green initiative. As discussed earlier, Hanson and Berman (1998: 10) observed the drivers for growth in the healthcare environment within a country. They found that with a ten percent increase in income in a country, private physicians per million increased by 16 percent, while public physicians increased by only nine percent. They also found that for the same increase in income of ten percent within a country, private hospital beds increased by eleven percent, while public hospital beds increased by only five percent. This indicates that Canada will be slow to respond to increases in demand for healthcare.

At the annual OHA conference on Green Healthcare held in Toronto, Canada earlier in 2011, Graham Takata presented the OHA findings to Ontario hospitals. Takata (2011a) presented that less than one percent of all buildings currently in existence are newly constructed. Therefore, there will be a much higher focus on improving existing hospitals and existing systems, rather than new construction projects. According to Takata, hospitals produce two and a half times more GHG emissions and utilise much more energy than any other commercial buildings. It seems the main obstacles for the implementation of green building projects in Ontario are similar to those experienced in the implementation of energy-efficient initiatives, being availability of financing or capital and expected payback period. Due to the size and value of building projects, as well as the complex approval process by the provincial and federal government in Canada, green building projects in hospitals in Ontario are still very uncommon.

Due to the typical long payback period of capital employed for the construction of buildings, these types of green initiatives are not implemented to gain quick results or quick payback. Even renovation projects require a substantial amount of capital and the return on investment is long term. Looking at the built environment and green initiatives incorporated into building projects, this type of initiative can be used in an eco-efficiency strategy (Orsato, 2006). LEED constructed buildings are designed as low-energy, low-resource-utilisation entities that will result in substantial cost savings while reducing the carbon footprint. Since eco-built initiatives are almost always

associated with a certification like LEED, EMS or ISO, these initiatives can also be used in a 'beyond compliance leadership' strategy. Similar to the initiatives discussed in Section 2.2.1, eco-efficiency strategies and 'beyond compliance leadership' strategies can complement each other in this situation as well. However, the two strategies will only complement each other if the market that it serves is conducive to competition.

Looking at the complexities of green initiatives associated with building projects, it will be hard for Ontario hospitals to truly justify the capital investment into green building projects, unless it is purely based on cost savings and the subsequent reduction in the cost of healthcare delivery. This addresses another important component of the research question listed under Section 1.2.1. At this stage, there is no indication that there is any pressure from either the government/legislators or the public to incorporate green initiatives into building projects. This may be completely different in the US where more new hospitals will be constructed (Hanson & Berman 1998: 10) and where the competitive environment can allow for green built projects to drive a 'beyond compliance leadership' competitive strategy.

2.2.3 Alternative energy

The most common alternative energy projects across the board involve projects with wind turbines, solar panels, biogas and hydrokinetic energy (Environmental Leader, 2011). Alternative energy can be applied directly, meaning that a company can deliver electronic energy directly for its own usage. An example would be photovoltaic solar panels that would provide energy for lighting. Another way of employing alternative energy would be through an indirect way. In this example companies would invest in a wind turbine which would feed into the normal electricity grid, and earn income from it that would offset their own electricity costs. Figure 2.5 indicates the usual progression and activities that companies follow to implement overall energy-saving initiatives that can be presented as an upside-down triangle (Volschenk, 2011). Firstly, it starts by promoting a change in behaviour. This is a relatively inexpensive activity and in general quick to implement. This would include initiatives like switching off lights when leaving a room or when going home, switching off computers and electronic equipment when not in use. The following phase is usually the implementation of some form of energy efficiency initiatives, such as more efficient water heating equipment or low-energy lighting. Lastly, organisations typically offset their energy usage against an alternative energy source. In this instance, the company invests in buying cheap and environmentally-friendly energy, rather than further reducing its own usage.

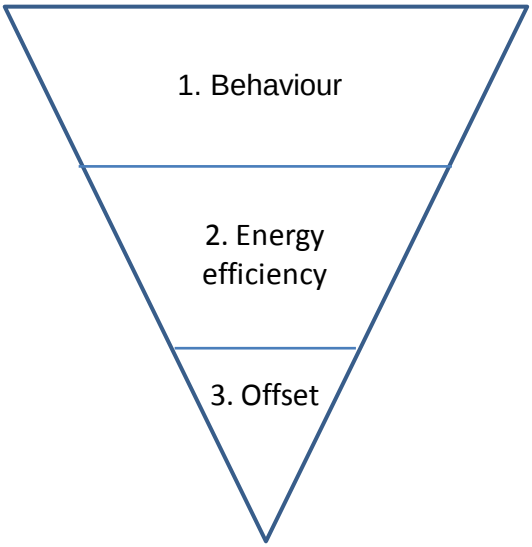
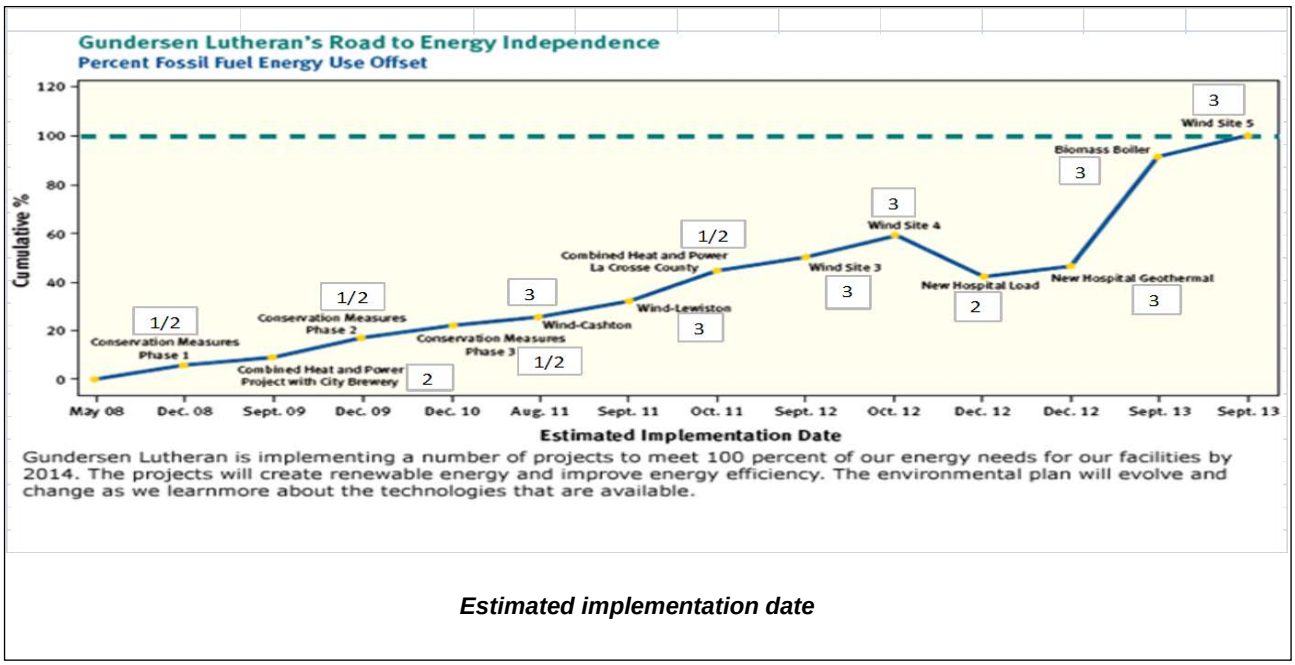


Figure 2.5: Common actions in the implementation of energy-saving initiatives

Source: Volschenk, 2011.

In the US, hospitals have been looking at alternative energy resources as a means to save on their energy bill and some have embraced the challenge to become energy neutral in the future. The best example of this is the Gundersen Lutheran Hospital, based in La Crosse, Wisconsin. This hospital set itself aggressive targets in 2008 of reducing energy consumption by 20 percent by 2009. It further wants to be completely self-sustainable by 2014, generating 100 percent of its own electricity using renewable energy (Environmental Leader, 2009). Figure 2.6 shows how the various alternative energy resources are to be utilised as well as the planned timelines. The planned energy savings project also demonstrates the three different phases in which energy savings are obtained as shown in Figure 2.5. These are indicated in Figure 2.6 as numbers: (1) change in behaviour; (2) energy efficiency; and (3) offset.

As indicated in Figure 2.6, Gundersen Lutheran Hospital is planning to use a combination of energy-saving initiatives in combination with a shared heat-and-power project with the City Brewery and the La Crosse County, wind generation and a biomass boiler. More specifically, the hospital has made available a number of case studies on its website explaining some of these projects (Gundersen Lutheran, 2011b). These case studies show the advantage of entering into partnerships to reduce the implementation costs of projects like these. Without the cooperation of the City Brewery and the La Crosse County, reaching its targets would be impossible.



Estimated implementation date

Figure 2.6: Gundersen Lutheran's road to energy independence

Source: Adapted from Gundersen Lutheran, 2011a.

As can be seen clearly in Figure 2.6, the energy-saving projects start with 'change in behaviour' initiatives, closely linked with 'energy efficiency' initiatives, depicted as (1/2). Conservation Measures phases one, two and three fall into these categories. The combined heat-and-power project in conjunction with the City Brewery, is an energy efficiency initiative, depicted by (2). The wind sites and biomass boiler comes later in the project and is typically an example of 'offset', depicted as (3). The use of alternative energy is usually an 'offset' initiative.

Gundersen Lutheran Hospital (2011b) lists six specific case studies that are variations of energy efficiencies and alternative energy projects. These are:

i) Creating energy from garbage – methane gas from the La Crosse County landfill will be used to generate clean energy (Figure 2.7);
ii) Using waste biogas – waste biogas from City Brewery is turned into electricity (Figure 2.8);
iii) Using the sun to heat water – using solar panels and a heat exchanger to produce hot water;
iv) Using visible solar panels – solar panels on the roof of the underground parking ramp act as an advertisement for the hospital's environmental initiatives to patients and visitors; and
v) Harnessing the wind – the hospital is building a two-turbine wind farm that will feed electricity into the normal power grid, and the hospital will be paid for it.

Points (i) and (ii) are clearly industrial ecology applications, which aim at reducing waste or designing closed loop systems whereby energy can be harvested from the process (Garner & Keoleian, 1995).

The utilisation of wind generation and a biomass boiler highlights another interesting concept known as ‘free rider’. Wiser and Pickle (1997: 13) described the free rider problem as a situation where a part of the population received the benefits of green power programmes without investing into the project. In the Gundersen Lutheran Hospital’s case, the hospital, City Brewery and La Crosse County will invest in setting up wind farms and biomass boilers. However, the green power will feed into the normal electricity grid and consumers who did not invest in this project will also receive the advantage of using green energy.

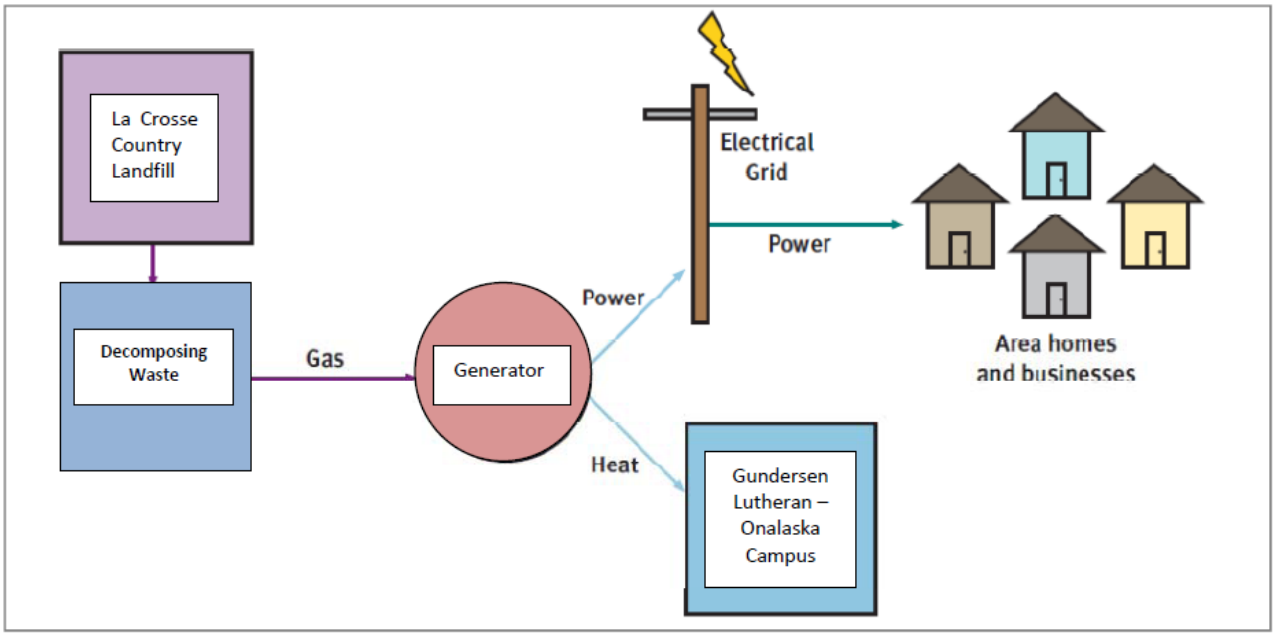


Figure 2.7: Using garbage to create green energy

Source: Gundersen Lutheran, 2011b.

It is obvious that green initiatives like the ones being implemented by Gundersen Lutheran Hospital, require a substantial amount of capital up front. According to Jerry Arndt, Senior Vice President of Business Services at Gundersen Lutheran Hospital, all upgrades are made while keeping a close eye on both sustainability and financials (Environmental Leader, 2009). This hospital is spending around $6 million per year on energy and this is increasing by $350 000 per year. In an organisation that has a four percent operating margin, this means that to see an increase of $6 million in bottom-line profits (which is equivalent to a reduction of $6 million in expenses), the hospital will have to increase its revenue by $150 million ($150 million X 4% = $6 million). Therefore, if the hospital’s revenue stays constant, but it can save $6 million in electricity costs, the effect is the same as if the hospital increased its revenue by $150 million.

Saving costs is clearly the primary driver in a business like this. In the US, competing hospitals are trying to increase the number of patients to their facilities, but initiatives like the ones implemented by Gundersen Lutheran, can most certainly fulfil two roles. On the one hand, it creates a very efficient mechanism to reduce costs and reduce the production of GHGs; on the other hand, it

widely advertises its green initiatives in the media, at the facility itself and on their website: “We will use our Envision program as a tool to reduce the cost of care for our patients” (Gundersen Lutheran, 2011a). The hospital clearly advertises a value proposition to its patients that they can expect their health bills to be reduced due to the environmental initiatives being implemented by the hospital.

This is a very good example of incorporating green initiatives in a competitive strategy. Referring to Orsato (2006), Gundersen Lutheran Hospital actually employed three different strategies in one. Firstly, it implemented an eco-efficient strategy by reducing its costs by implementing a combination of energy-saving and alternative energy initiatives. Secondly, it employed a type of ‘beyond compliance leadership’ strategy by widely advertising its green initiatives. Thirdly, it employed a combination of eco-branding and environmental cost leadership strategies with its value proposition of “will use our Envision program as a tool to reduce the cost of care for our patients”.

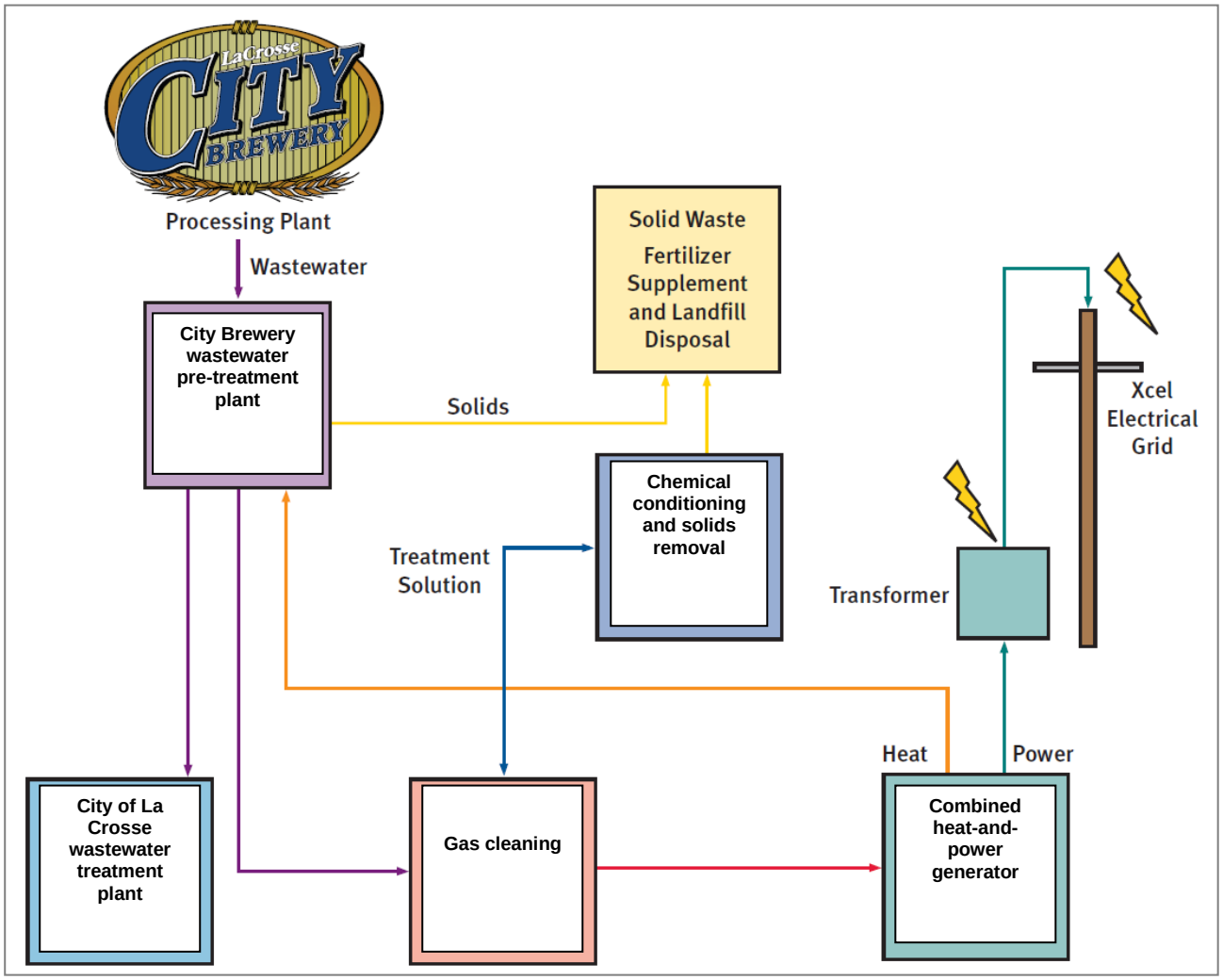


Figure 2.8: Using brewery waste to create green power

Source: Gundersen Lutheran, 2011b.

Canada also has a couple of examples of hospitals reverting to alternative energy utilisation. Although one can argue that there is a definitive business case for this based on Gundersen Lutheran's figures, the biggest obstacle remains the availability of capital to implement such initiatives. This is even more so considering that the typical payback periods of these projects are long term. The most prevalent and publicised alternative energy projects in Ontario, involve solar energy.

The Hospital for Sick Kids Atrium in Toronto was the first to install a new sun panel in 2007 for the production of hot water (Schaefer, 2007), while Sunnybrook Hospital unveiled 'The Harry Taylor Solar Energy Walk' in 2009 (Sunnybrook, 2011). Although solar water heating and solar energy differs substantially in implementation costs as well as payback periods (Healey, 2007), both these projects are attempts to reduce GHG emissions. The Sunnybrook initiative was part of a partnership initiative launched in 2008 between Sunnybrook Hospital and Honeywell to improve the hospital's energy consumption and to roll out new green initiatives (Green Sunnybrook, 2009). These projects are a combination of energy-saving initiatives as well as alternative energy, but also incorporate a wide range of green initiatives that include waste reduction, food and transportation.

Since solar water heaters are relatively inexpensive and easy to install, it is possible that more hospitals are using this already. Unfortunately, solar electricity is much more complex and expensive to install and it is to be expected that this will not be as popular as solar water heating. However, other alternative energy initiatives in the rest of Canada have been reported. Strashok *et al*. (2010: 6) published a research report on Canadian hospitals based on available data on the internet. This research indicated two other hospitals that have been using different forms of alternative energy. These are Kelowa General Hospital that is using water from the Okanagan Lake for cooling and Shuswap Lake Hospital that is also making use of geothermal heating and cooling. The research and reports on alternative energy utilisation in hospitals in Canada indicated that there is a much bigger emphasis on energy-saving initiatives than looking at alternative energy options. In all likelihood, this is purely a matter of finances.

The use of alternative energy and energy-efficient initiatives are very closely linked. The big difference is that energy-efficient initiatives can be employed rapidly and with much lower capital investment, while the use of alternative energy is associated with high capital investment and a prolonged implementation period. When keeping in mind that capital availability is one of the major barriers for the implementation of green initiatives in Ontario hospitals, it is to be expected that alternative energy projects will not be on top of the list of green projects in Ontario hospitals. Based on the information available in the literature, there is certainly no expectation that alternative energy initiatives would serve any other purpose than to reduce costs. However, it can have a very substantial publicity value. A model like the one used by the Gundersen Lutheran hospital would have real potential in Ontario hospitals as well.

Clearly, when applying Orsato's model as shown in Figure 1.1, alternative energy can form part of a number of competitive environmental strategies. Due to its ability to reduce costs, it can form part of an eco-efficiency strategy. In addition, due to the possible publicity associated with alternative energy sources like wind or bioreactors, it will most definitely have the potential to be part of a 'beyond compliance leadership' strategy.

Referring to the research question as defined under Section 1.2.1, it highlights yet again the difficulty that Ontario hospitals might have in implementing alternative energy as a green initiative. Ontario hospitals may be able to justify the implementation of this initiative based on cost savings, but the potential high capital requirements and potential long payback period may be major barriers. The literature suggests that for Ontario hospitals, initiatives like these will most likely only be implemented as part of an eco-efficiency strategy.

2.2.4 Transportation

As discussed under Section 1.1, transportation is listed as one of the seven opportunities for action by hospitals by the WHO and HCWH (2009: 23). However, there is little evidence that hospitals have implemented meaningful green initiatives in transportation. Transportation makes out a much smaller part of a hospital's expense budget than, for example, electricity usage. If cost savings is the main motivation for implementing green initiatives, then transportation will not get a great deal of attention.

One can consider the amount of GHGs that hospitals in Canada produce. In 2003, hospitals in Canada used 52 million gigajoules (GJ) of energy, this is equal to 450 000 ordinary Canadian households (Strashok *et al*., 2010: 14). The GHG emissions from this utilisation are in the order of 2.8 million tons, which is equivalent to approximately 814 000 compact or 533 000 sports cars. For this reason, it would make sense why hospitals would rather concentrate on energy reduction initiatives than on transport-related green initiatives.

The Green Guide for Health Care (2008: 06-1) also published a number of transportation initiatives that can be implemented by hospitals. Hospitals can earn credits if they can demonstrate that they have obtained some of the goals set in the guidelines. The guidelines use the following methods of alternative transport:

i) Walking;
ii) Public transport;
iii) Bicycles or other human-propelled means;
iv) Carpools;
v) Vanpools;
vi) Low-emission vehicles;
vii) Fuel-efficient or alternative fuel vehicles;
viii) Compressed work weeks; and
ix) Telecommuting.

Although there is a case for hospitals to look at transportation as part of their green initiatives, there is no evidence that this is a high priority area. Referring back to Section 2.2, LEED also made no provision for any transport-related points. In general, transportation is responsible for a relatively small percentage of the overall cost in a hospital; however, its impact on the environment is not negligible. As an example, transportation in the UK is responsible for 18 percent of the total carbon footprint of the National Healthcare System (NHS) (WHO & HCWH, 2009: 18).

This does not mean that hospitals have not implemented any transportation initiatives. Sunnybrook Hospital in Toronto, Canada, has implemented a sustainable transportation programme (Sunnybrook, 2011). The programme has two components. The first is bicycles. The hospital created various safe bicycle parking spaces while promoting the benefits of cycling to work and on campus. The second component is shuttle busses. Sunnybrook has a shuttle service between three sites on the campus as well as an express service to two subway stations. The express shuttle bus is environmentally-friendly and operates on duel fuel, natural gas and gasoline. This is a good example of low-cost environmental leadership and can be very effective as an environmental strategy. Sunnybrook has actually achieved two goals with this. Firstly, it addressed personal environmental concerns from employees and launched an initiative to get them involved in the cycle to work initiative. Secondly, it demonstrated real environmental concerns to the public with the use of environmentally-friendly shuttle buses.

Referring to Orsato (2006), it is difficult to link green transportation initiatives in hospitals to a specific competitive environmental strategy. Because there is such a small cost-saving component associated with this initiative in hospitals, it can hardly be seen as a major component in an eco-efficiency strategy. It may rather be part of the ‘beyond compliance leadership’ strategy; however, it is not associated with any specific certifications. In spite of this, the overall effect of this strategy may be powerful enough in effecting both consumer and employee behaviour and may have the potential to form part of a ‘beyond compliance leadership’ strategy.

The justification for the implementation of green transportation initiatives in Ontario hospitals is expected to be different from other initiatives that were evaluated above. Where it seems that previous initiatives were primarily focused on cost savings, transportation initiatives have a small cost-saving component. It is also quick to implement, requires relatively little capital and serves more of an environmental awareness purpose rather than anything else. If seen in relation to the research question defined for this study under Section 1.2.1, this information suggests that the extent of this initiative will be small and not a primary area of focus in Ontario hospitals.

2.2.5 Waste

There are generally two distinct categories to waste management. The first is related to the amount of waste being generated and the second is related to the toxins and the potential harm that hospital waste can cause. The WHO and HCWH (2009: 20) waste category, also listed under Section 1.1, refers to both. While the amount of waste being generated is directly correlated to

GHG production through transport, processing and production of replacement products, the reduction in toxic chemicals is directly related to the health of the people and the planet.

The amount of waste being generated by a hospital can be staggering. As an example, a single healthcare facility can generate an average of six tons of waste a day (HCWH, 2011a: 3). Over a period of one year, this equates to 2 190 tons of waste. It is therefore easy to understand why healthcare facilities in the US generate more than two million tons of waste per year (Brannen, 2006:83). Brannen divided waste into four different streams and allocated a target for the potential savings in waste, given that best practices are adhered too. This is shown in Table 2.2.

Table 2.2: Basic waste streams

Waste Type	Definition	Target as Percentage of Total Waste	General Disposal Methods	Typical Cost for Disposal
Waste reduction programs (recycling, reuse, source reduction)	Reducing: using less product in the first place, thereby generating less waste Reusing: materials exchanges, using a product until it is no longer usable Recycling: Refuse which is reprocessed into new products	20-40%	Most recyclables are shipped off site for processing and subsequent reuse.	Wide range • Cardboard and paper should generate revenue. • Glass and plastics typically cost. • Objective: total cost of program should beat landfill costs (i.e., avoided landfill costs pay for the program)
Infectious waste	Solid or liquid wastes that have a significant potential for transmitting infection or require special handling due to state regulations and some federal regulations	8-15%	• Treatment, such as autoclave then landfill • 10% of total RMW is path waste requiring incineration	Off-site treatment: $0.26 - $0.38 per lb; $500 – $800 per ton
Hazardous chemical waste	Solid or liquid waste containing flammable, toxic, corrosive, or reactive chemicals. Also includes a special hazards category (i.e., radioactive) and listed wastes.	<1%%	Managed according to OSHA, EPA, and local and state regulations and shipped off site for proper disposal.	Up to $5000 per ton depending upon material
General solid waste	Solid wastes that are not hazardous, infectious, or recyclable; may include some food wastes, trash, and construction and demolition waste (although those too can be recycled)	50%	Landfill or municipal solid waste incinerator	Wide range depending upon area of country: $0.02 - $.50 per lb.; $33-$100 per ton

Source: Brannen, 2006: 86.

Table 2.2 shows the four different waste streams, being (1) waste reduction; (2) infectious waste; (3) hazardous chemical waste; and (4) general solid waste. Of these four waste streams, infectious waste has the highest potential of savings versus costs. However, the opposite is also true. For every pound (or applicable weight unit) of red bag waste generated over the target of eight to 15 percent, a hospital will spend ten times more on every unit above the target (Brannen, 2006: 85).

Apart from the environmental impact that waste has on GHG production, waste processing can have a very serious impact on the health of people in the surrounding area. This was first recognised in 1985 when the Environmental Protection Agency (EPA) published a report identifying the use of medical waste incinerators as the largest source of dioxin contamination. Medical incinerators also contributed to ten percent of mercury air emissions (US EPA, 2006). Dioxins are super-toxic chemicals that are release when organic chemicals and plastics that contain chloride, are burned (Campbell, 2010). The dioxin's toxicity is second only to nuclear waste and is one of the most potent carcinogens known to humanity. As a result, the use of medical waste incinerators dramatically reduced from nearly 5 000 in the US to less than 100 (Levin, 2006). One of the main contributors to dioxin release when incinerated is polyvinyl chloride (PVC) plastic. PVC has high chloride content and is commonly used in a variety of hospital products like intravenous (IV) tubing, IV bags and blood bags. As a result, the US Food and Drug Administration (FDA) urged healthcare facilities to seek safer alternatives (Cohen, 2006: 3). As a guideline to safer products, Rossi and Lent (2006) published an environmental preference spectrum shown in Figure 2.9.

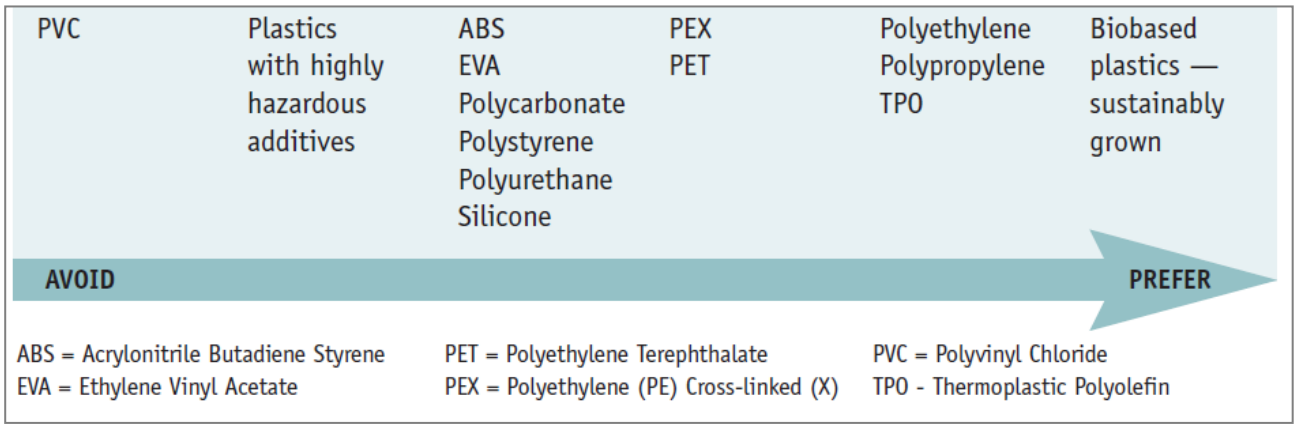


Figure 2.9: Environmental preference spectrum

Source: Rossi and Lent, 2006: 66.

All plastics are made from petroleum products, except for bio-based plastics. While bio-based plastics would be the preferred product to use in all instances, it is not yet price competitive and makes up less than one percent of the global market (Butler, 2007). Because of the limited availability of bio-based plastics, hospitals have to look at other options, like how recyclable are the plastics that they are using. Table 2.3 shows the recycle percentages of plastics at municipal solid waste plants. Even if polyethylene terephthalate (PET) (which has the highest recycle rate) is

recycled, just 14.3 percent of the product can be recovered. This means that even recycling the highest recyclable, there is still a loss of nearly 86 percent. The only real effective way to reduce plastic waste, and therefore GHG production, is to reduce the consumption. However, hospitals still need to get rid of waste in some way or another. Since incineration is now heavily regulated and becoming increasingly unacceptable, more hospitals are switching to non-incineration technology.

The principles of non-incineration is based on a programme that minimises and segregates waste (HCWH, 2001: 3). According to the HCWH (2001: ix), a hospital generates between four and 20 kilograms of waste per bed. This waste is a combination of general waste, red bag waste (infectious waste), hazardous and low-level radioactive waste.

Table 2.3: Plastic recycling in municipal solid waste

Plastic	Generation (thousand tons)	Recycling (thousand tons)	Recycling Level (percent by weight)
PET	2,870	410	14.3%
High density polyethylene (HDPE)	5,140	470	9.1%
Other plastics	5,080	350	6.9%
Low density polyethylene (LDPE) and Linear low density polyethylene (LLDPE)	6,210	150	2.4%
Polypropylene	3,610	10	0.3%
Polystyrene	2,270	0	0.0%
PVC	1,470	0	0.0%
Total plastics in MSW	26,650	1,390	5.2%

Source: Rossi and Lent, 2006: 67.

It is estimated that around 15 percent of this waste will be infectious waste. By properly segregating waste, the effectiveness of processing waste will improve and the costs of managing waste will decrease. If waste is properly segregated, the infectious and regulated medical waste (RMW) can be treated using thermal, chemical, irradiation or biological methods.

Pooling non-infection or non-hazardous waste with infectious and hazardous waste can have a significant cost implication. As an example, the Beth Israel Medical Centre in New York reduced the facility's disposal costs for RMW by 60 percent, simply through education, proper segregation and the strategic placement of red bag containers (HCWH, 2000: 4).

Waste management is one area where hospitals in Canada have been involved in for a number of years. Environment Canada, a department of the government of Canada, posted the example of The Hospital for Sick Children (HSC) as one of the success stories (Environment Canada, 2001). Early in 1990, HSC had an annual waste expenditure of $1.2 million dollars. Over a seven-year period, HSC implemented a number of waste management initiatives, including the shutting down of their incinerator.

Overall, they demonstrated the following improvements (Environment Canada, 2001):

- 35 percent reduction in biomedical waste in patient areas through proper waste segregation;
- 30 percent reduction in biomedical waste hospital-wide;
- 25 percent reduction in solid waste through recycling;
- Implemented the Mercury Elimination and Reduction Challenge Project;
- 50 percent of all waste is recycled.

Waste management as a green initiative has a strong argument. There are a number of benefits to proper waste management. This would include reducing GHG on multiple levels, reducing toxicity to society, enhancing sustainability and reducing costs. Referring back to Section 2.2.1, which lists the barriers to the implementation of energy-saving initiatives, it is likely that the biggest barrier for implementing waste initiatives would not be the availability of capital as seen in energy-saving initiatives, but rather the availability of human resources and the buy-in from staff and management.

It is clear that waste management as a green initiative is more about a level of compliance needed, rather than gaining a competitive advantage. None of Orsato's (2006) competitive environmental strategies shown in Figure 1.1 would directly be linked with compliance. However, if specific co-benefits to compliance are considered, there are components of waste management that will support a number of the competitive environmental strategies. In the case of the Hospital for Sick Children, which has seen a huge reduction in waste management costs, waste management can definitely be seen as being part of an eco-efficiency strategy. However, the big concern with waste management is not cost savings, but rather the direct and indirect effect on the environment and human health. When seen in relation with the research question for this study, this is the first green initiative that can be justified based on true environmental concerns, rather than cost savings. This green initiative also has a high requirement for regulatory compliance. This most certainly should drive the justification for this initiative, more than any of the other green initiatives listed under Section 1.1.

This is again an indication that legislative and regulatory compliance plays a role in the motivation of some of the green initiatives. Referring to the research question under Section 1.2.1, literature indicates that one of the factors to consider is the impact of regulatory and compliance requirements on the reasons for the implementation of green initiatives. The implications are that Ontario Hospitals may be forced to implement green initiatives, but they may not have the resources to do so. As a result, there would be a fine balance between compliance and affordability.

2.2.6 Water

The UK Environment Agency published a report in 2008 that looked at GHG emissions and water supply (UK Environment Agency, 2008). This report used the Defra Shadow Price of carbon of £26 per ton of carbon dioxide (CO_2) standardised in 2008 and rising by two percent per year after that to calculate cost-benefit projects (UK Environment Agency, 2008: 5). There are a number of key findings in this report. Firstly, the water industry alone is responsible for 0.8 percent of the UK's GHG emissions, however, when water heating is included, this figure shoots up to 5.5 percent. It further found that 89 percent of GHG emissions related to water are a result of non-industrial use and included energy for water heating. In comparison, only 11 percent of GHG emissions are a result of treatment and supply of public water (UK Environment Agency, 2008: 26).

Another report published by Maas (2009), specifically looked at the effect of water on GHG emissions in Canada. The report discussed the energy inputs associated with the water use cycle (Figure 2.10). The 'Indirect Energy' in Figure 2.10 refers to the energy used by the municipality to pump water as well as the treatment of water and wastewater. The 'Direct Energy' refers to the energy used for heating, water softeners and site purification. 'Embedded Energy' refers to the energy required to manufacture chemicals and equipment to treat water and wastewater. Of these, the affect of 'Indirect Energy' plays the biggest role when considering water as part of green initiatives. This is because 'Direct Energy' usage is usually addressed in other green initiatives like energy savings and alternative energy.

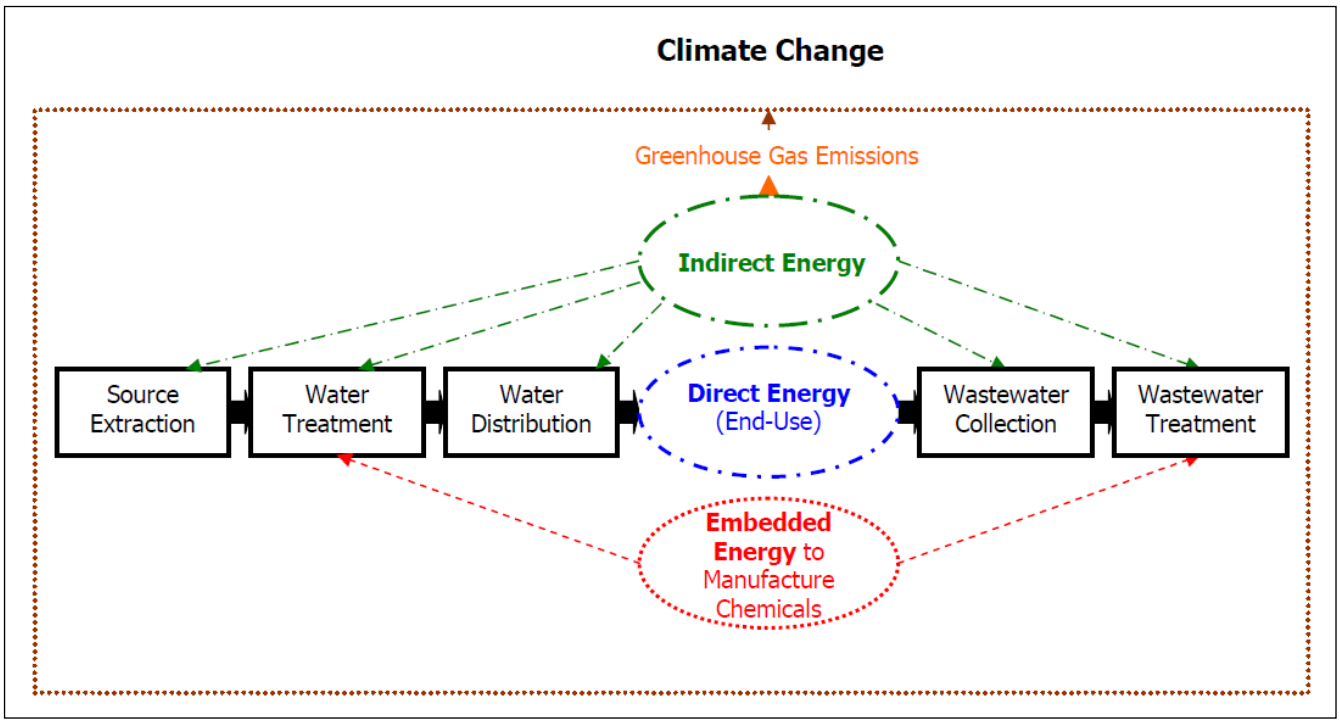


Figure 2.10: Components of the water use cycle affecting global warming

Source: Maas, 2009: 6.

Figure 2.11 shows the 'Indirect Energy' intensity for each component in the water cycle. The whole supply chain for water supplied by municipal systems is energy intensive. The Association of Municipalities of Ontario found that a third to half of their total municipal electricity consumption was for water and wastewater services; that is double the amount of electricity spent on street lighting (Maas, 2009: 3). Certain municipalities found that water and wastewater facilities can consume anything between 25 and 60 percent of the total electricity bill (Maas, 2009: 3).

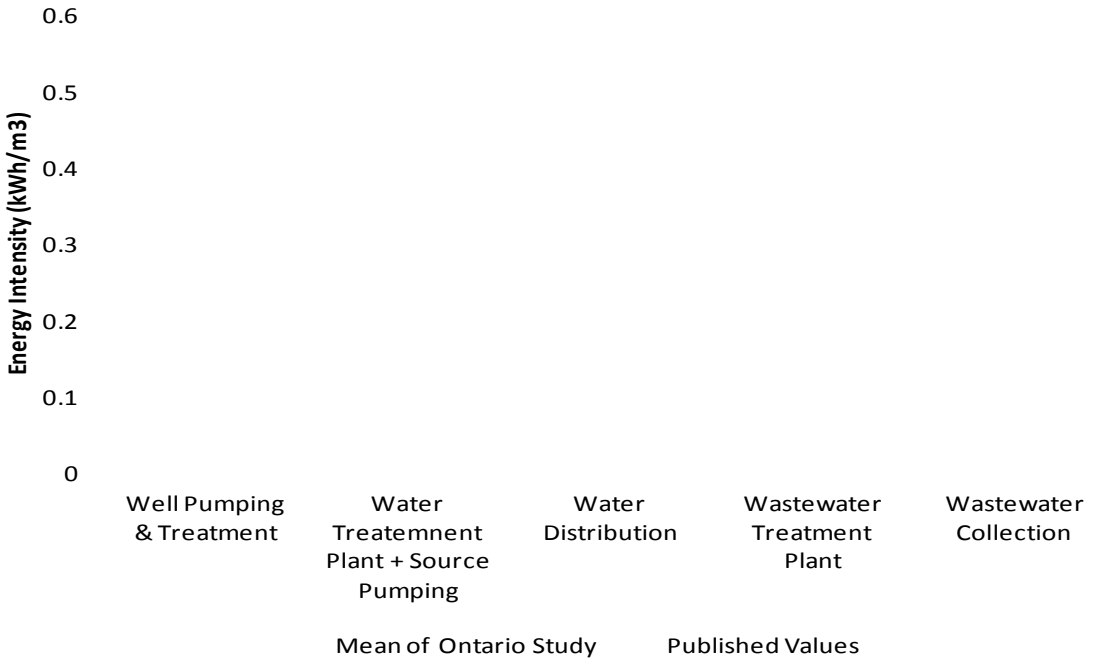


Figure 2.11: Indirect energy intensity for each water cycle component

Source: Maas, 2009: 16.

The 24/7 operation of a hospital as well as the type of services provided, mean that these facilities have a different water usage profile compared to other conventional commercial operations like hotels. A case study done by the Massachusetts Water Resources Authority (2011) looked at seven large hospitals in Boston and determined the average water usage by category. It also conducted a case study on Norwood Hospital. The average water usage results for hospitals are shown in Figure 2.12.

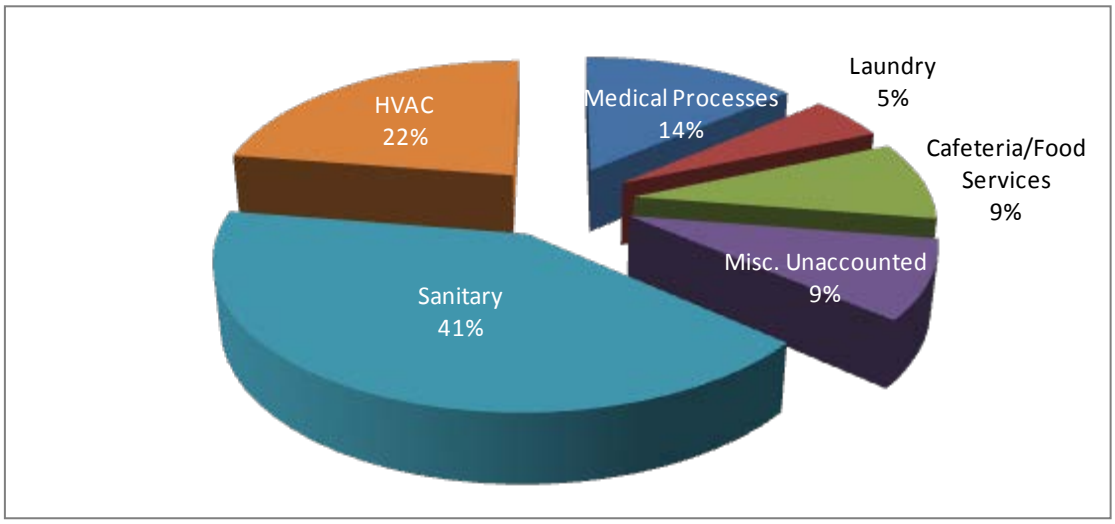


Figure 2.12: Average hospital water use by category

Source: Massachusetts Water Resources Authority, 2011.

A typical hospital uses between 150 and 1 300 litres of water *per capita* per day; 65 percent of this is used for HVAC and sanitary purposes (Massachusetts Water Resources Authority, 2011). This suggests that there are definite opportunities for both water savings and subsequent cost savings. Norwood Hospital reduced its water use from 180 million litres per year to 130 million litres per year in three years, which is a reduction of 26 percent. This project had a payback time of just 0.40 years. The savings were achieved through four major initiatives:

- Elimination of cooling water for medical compressors: 30 million litres water saved;
- Recirculation of cooling water for vacuum pumps and installing sanitary retrofits: 43 million litres saved;
- Replacing flush valves in toilets with low-consumption aerators: 11 million litres saved;
- Refrigeration system retrofit: 7.8 million litres saved.

In Ontario, Canada, a number of hospitals have been working on water-saving initiatives. One example is St. Michael's Hospital located in Toronto (Canadian Centre for Pollution Prevention, no date). Similar to Norwood Hospital, St. Michael's Hospital replaced their medical vacuum pumps with a waterless system. This saved St. Michael's Hospital 20 189 m^3 of water or $33 312 annually. It also changed the magnetic resonance imaging (MRI) machine's cooling units to use closed-loop systems, saving an additional 45 423 m^3 of water or $74 494 annually.

In reality, few people are aware of the energy intensity associated with water supply and purification. The possibility exists that most organisations will see the reduction in GHG as a secondary effect to this initiative.

In view of Orsato's (2006) model in Figure 1.1, water-saving initiatives undoubtedly form part of an eco-efficiency strategy. Because water savings are primarily about costs savings and secondarily about energy and associated GHG reduction, there is a strong possibility that some people would

not even view this initiative as a green initiative at all. This is true in particular considering that most people do not link water savings to a reduction of GHG. The implication of this is that this initiative will most probably be seen as a pure cost-saving initiative, rather than a green initiative. The extent of implementation of this initiative is expected to be small, but it also means that water-saving initiatives have the potential of having a substantial effect on both costs and GHG emissions. This would be a strong argument for this initiative to be used as a competitive strategy. Up-front capital required seems relatively small compared to the potential returns, with the possibility of quick payback periods. Seen in view of the research question under Section 1.2.1, hospitals in Ontario can most certainly justify water savings as a green initiative based on costs savings.

2.2.7 Food

Although most people will recognise that there is a direct link between climate change and the amount of energy used, few are aware of the impact of food production on climate change (HCWH, 2009: 1). Figure 2.12 shows how much agriculture is contributing to GHG production. It can be seen that the two main gases produced in agriculture are nitrous oxide and methane. The emissions from the supply chain activities, however, are excluded from the agriculture data in Figure 2.13. These would be the transportation, processing, refrigeration, preparation and waste management, which are included in the other sectors above. The production of methane and nitrous oxide is significant in its global warming potential. Methane gas has a 23 times and nitrous oxide has a 298 times greater impact on global warming than CO_2 (HCWH, 2009: 2).

As with the case of waste and water green initiatives, hospitals may be unaware of the impact of food on GHG emissions and therefore implement food programmes for other reasons. There are specific recommendations available to hospitals which are published by Health Care Without Harm. These are known as the Food Service Climate Change Reduction Strategies (HCWH, 2009: 3). The specific strategies are:

- Creating balanced menus with less meat;
- Procuring food from local producers and adjusting menus seasonally;
- Buying food that are certified ’organic’ or ‘sustainable’;
- Switching to reusable or bio-based food containers;
- Eliminating bottled water which is 2 000 times more energy intensive than tap water;
- Being energy efficient in commercial kitchens.

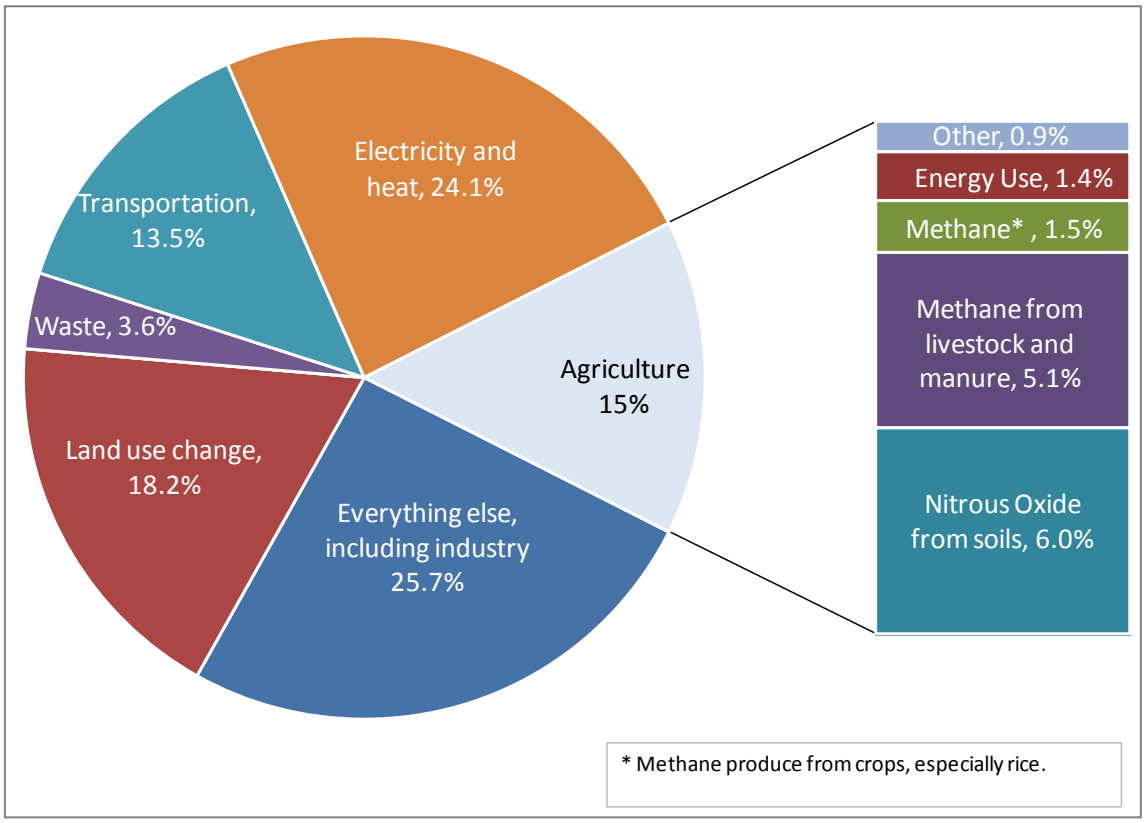


Figure 2.13: GHG emissions (year 2000) in CO_2 equivalents

Source: Adapted from World Resources Institute, 2010.

HCWH has been aggressive in promoting its "Healthy Food in Healthy Care Pledge". To date, 350 hospitals in the US have signed the pledge and are implementing policies and programmes aimed at "first, do no harm" (HCWH, 2011b). In a pilot study done on balanced menus in four San Francisco Hospitals Bay area hospitals, it was found that, with the reduced purchasing of meat as part of balanced menus, the savings will be around $400 000 per year. In addition to this, the pilot also demonstrated that meat-related GHG can be reduced by 26 percent (Lagasse & Neff, 2010).

There are numerous examples of hospitals in the US that are actively working to be green in their food systems. Examples are the Loma Linda University Medical Centre and 37 other hospitals within the same group that are promoting a vegetarian diet and menu, the Holy Redeemer Medical Center that provides compost from waste food to two local farms who supply the kitchen with fresh foods and the Good Shepherd hospital who only purchases organic beef that is raised and processed within 50 miles from the facility (HCWH, 2009: 4).

Hospitals in Ontario, Canada, have also implemented green food initiatives. St. Michael's Hospital is a 518-bed hospital in Toronto and has been on the forefront in greening nutritional services. It serves 3 000 meals daily and 130 therapeutic diet types (Fletcher, 2011). The hospital has implemented a number of initiatives targeting green nutrition. These include dishroom (dishwasher facilities) conversions, recycling in the marketeria, recycling reviews, elimination of Styrofoam, a service ware review and procuring sustainable food. However, Heather Flecther, Food Production

Manager at St. Michael's Hospital, presented their findings on the hurdles to implement green food services at the annual OHA conference on Green Health Care (Fletcher, 2011). The hurdles are summarised as follow:

- No policies and procedures for defining, selecting and procuring sustainable food existed.
- Current vendors have limited lines of sustainable products and able to provide limited information on the subject.
- The onus is on St. Michael's Hospital to search and select its sustainable food with limited available information sources.
- There are limited assurances of availability and consistent products from local producers.

As can be seen, these hurdles are not associated with the lack of capital or funding as in the cases of energy and building green initiatives, but are purely operational. However, the extent of these hurdles should not be underestimated. It is a lot easier to keep buying from existing providers than to change to new sustainable product providers, especially if one considers the complex procurement process that has to be in place for any state funded operation in Canada.

Food is unique because it does not necessarily reduce the costs of a hospital. In some instances, going the organic route or not having access to retail supply chains that could provide access to sustainable food resources, will increase the overall cost of food. If seen in light of Figure 1.1 and Orsato's (2006) competitive strategies, food can therefore be incorporated under a number of different strategies. If food initiatives are implemented to obtain cost savings, then this can form part of an eco-efficient strategy. In addition, the benefits to organic and local food producers can be publicised, which means this can be part of a 'beyond compliance leadership' strategy as well. There is also an eco-branding option with unique hospital food menus, especially if patients would be prepared to pay extra for an organic or sustainable healthy menu.

Seen from the perspective of the research question as formulated under Section 1.2.1, a number of points are highlighted. Firstly, food is probably not going to be a green initiative that has been implemented widely in Ontario hospitals. Secondly, the primary motivation for the implementation of food initiatives is still to save costs, but it has a strong secondary motivation associated with this, being environmental sustainability and healthy eating for patients. This would be a strong basis on which Ontario hospitals can justify the implementation of green food initiatives.

2.3 SUSTAINABILITY LEGISLATION APPLICABLE TO HOSPITALS IN ONTARIO

The legislative impact on the operation of a hospital can change the behaviour of the institution. As already discussed under Section 2.1, Bansal and Roth (2000) argued that companies implement green strategies for three reasons: competitiveness, legitimation and environmental responsibility. Section 2.2 specifically looked at the different types of green initiatives that are being implemented in hospitals. However, it is important to understand what the current and future legislative drivers are in the Canadian hospital environment. The Canadian hospital environment is not a competitive

environment, meaning that hospitals are not competing with each other for patient numbers. Because of the current shortage of beds in Ontario, hospitals are constantly operating close to 100 percent bed occupancy (Ontario Health Coalition, 2011: 8). The lack of competitiveness in this situation means that the only two remaining reasons for Ontario hospitals to implement green initiatives are legislation and their environmental responsibility. If this is true, it is important to understand what the relevant legislation is in Ontario, and how it is enforced.

2.3.1 The Environmental Protection Act

The Environmental Protection Act (Ontario Ministry of the Environment, 2011) is the main act that controls and protects the environment in Ontario. It empowers the Ministry of the Environment to manage situations where contaminants are discharged, causing environmental damage. More specifically, the act prohibits the release of any contaminants that are likely to cause damage to the environment. In instances where approved contaminants are released, it may not exceed certain approved limits. The act further regulates spills and clean-ups and specifies liability for directors and corporate officers who have failed to take appropriate actions to prevent spills and contamination of the environment.

The specific sections in the Environmental Protection Act (Ontario Ministry of the Environment, 2011) that are directly applicable to hospitals in Ontario, relate to waste management. The section stipulates the following: “No person shall deposit, or cause, permit or arrange for the deposit of, waste upon, in, into or through any land or land covered by water or in any building that is not a waste disposal site for which an environmental compliance approval or renewable energy approval has been issued or a registration under Part II.2 is in effect and except in accordance with the terms and conditions of the approval or the regulations made for the purposes of Part II.2. 2010, c. 16, Sched. 7, s. 2 (30).”

This section regulates both solid waste and wastewater. Referring to Section 2.2.5, the problems that hospitals have are not only a large amount of waste to deal with, but also the restricted ways that they can use to disposed of it. The phasing out of incinerators at hospitals was partly due to this regulation. Incinerators are seen as a waste disposal site and are therefore subject to an approval process (Carter-Whitney, 2007: 20). Therefore, incinerators are required to have sufficient pollution control devices, like filters and scrubbers. In 1985 there were 137 incinerators operating in hospitals in Ontario and 62 percent of these were reported to be ill-equipped to handle biomedical waste (Weir, 2002: 354). The report suggested that 38 percent of the incinerators had to be replaced, while 24 percent had to be upgraded. Five years later, just 56 hospital incinerators were still operating and by 2003 all hospital incinerators were shut down (see R.R.O. 1990, Regulation 347, section 26 discussed under Section 2.3.1 (iv) below).

Another part of the Environmental Protection Act (Ontario Ministry of the Environment, 2011) that had a direct impact on hospitals is the removal of waste and the costs associated with that. This particular section stipulates: “No person shall use, or cause, permit or arrange for the use of, any

facilities or equipment for the storage, handling, treatment, collection, transportation, processing or disposal of waste that is not part of a waste management system for which an environmental compliance approval or renewable energy approval has been issued or a registration under Part II.2 is in effect and except in accordance with the terms and conditions of the approval or the regulations made for the purposes of Part II.2. 2010, c. 16, Sched. 7, s. 2 (30)."

This particular section regulates the whole supply chain of waste management. Because waste can only be surrendered to an organisation that has obtained the necessary approval, waste management has become an expensive part of the operation. This is clearly a motivation to reduce the amount of waste and to ensure that waste is segregated correctly. As noted under Section 2.2.5, every kilogram of waste incorrectly classified as biomedical waste will cost ten to a hundred times more than normal solid waste.

Individual regulations under the Environmental Protection Act, R.S.O. 1990. C. E.19 (Ontario Ministry of the Environment, 2011) that are applicable to hospitals, either directly or indirectly are:

i) O. Reg. 419/05, Air Pollution – Local Air Quality: Regulates the emissions of harmful substances released into the air.
ii) O. Reg. 127/01, Airborne contaminant discharge monitoring and reporting: Regulates reporting of contaminants released into the air.
iii) R.R.O. 1990, Reg. 338, Boilers: Regulates the quality of fuel, either fuel oil or coal, that is used in boilers. This specifically pertains to sulphur content.
iv) R.R.O. 1990, Regulation 347, General – Waste Management: Regulates general waste management. Section 29 regulated that all hospital incinerators were to shut down on or before 6 December 2003.
v) O. Reg. 452/09, Greenhouse Gas Emissions Reporting: Regulates the compulsory reporting of GHG for facilities generating more than 25 000 tons of CO_2.
vi) O. Reg. 359/09, Renewable Energy Approvals Under Part V.O.1 of the act: Regulates the implementation of renewable energy initiatives like bioreactors, solar panels and wind generation.
vii) O. Reg. 102/94. Waste audits and waste reduction work plans: Part IX applies specifically to hospitals: This regulation requires hospitals to do a waste audit, submit a written report annually and implement a waste reduction work plan that is also updated annually.

Every one of the regulations listed above plays a role in the planning and implementation of at least one of the seven potential green initiatives that hospitals can engage in according to the WHO and HCWH (2009: 23). Looking at the regulations in isolation, it would seem that a number of green initiatives discussed under Section 2.2 were implemented due to regulatory requirements rather than any other reason.

Regulation 347 in particular forced hospitals to shut down incinerators in 2003, forcing hospitals to start looking at alternative waste disposal measures. This is closely linked to regulation 102/94 part

IX that forces hospitals to conduct waste audits and to implement waste reduction initiatives. Regulation 452/09 came into effect on 1 January 2010 and requires hospitals to calculate and report their CO_2 emissions. This is an effort by the government to sensitise and motivate hospitals to be more proactive in cutting down on GHG emissions (Ontario Ministry of the Environment, 2011).

2.3.2 Regulations specific to greenhouse gas emissions in Canada

Since each province in Canada is regulated by both federal and provincial law, it is also important to understand what federal regulations are applicable to hospitals in Ontario. At present, there are three specific regulations in Canada aimed at regulating GHG emissions and one draft proposal, but none is specific targeted at hospitals. The first of the regulations is the passenger Automobile and Light Truck GHG Emissions Regulation and is aimed at reducing GHG emissions and establishing tests and standards that are in line with those of the US. This regulation is indirectly applicable to hospitals running and maintaining their own fleet of vehicles as discussed under Section 2.2.4. The second is the Renewable Fuels Regulation and ensures that a minimum quality of fuel is produced. The third regulation focuses on the reduction of carbon dioxide emissions from coal-fired power stations. Since hospitals are considered to be two and a half times more energy intensive than conventional commercial buildings (Takata, 2011a), a reduction in energy use will have a positive effect on the power generation industry and GHG emission reduction.

2.3.3 Regulatory implications on this research

The research question formulated under Section 1.2.1 (iii), seeks to identify how strong the external pressures are for the implementation of green initiative in Ontario hospitals. Of the different external forces that can exert pressure on hospitals, regulatory pressures are expected to carry the most weight due to the enforceability and implications of non-compliance to the law. The regulations discussed under Section 2.3.1, are very specifically focused on waste management. The regulations that are very specific towards the control of GHG emissions are not yet applicable to hospitals, apart from reporting requirements on GHG emissions. This means that, although there is pressure on hospitals to comply with waste management regulation, there are no other regulatory requirements that are exerting pressure on hospitals in Ontario to implement green initiatives. The expectation therefore is that there will be very little regulatory pressure on hospitals to implement overall green initiatives.

2.4 CONCLUSION

This chapter looked at the various green initiatives that have been implemented by hospitals in the US and Canada. This was done in the context of the seven opportunities identified to reduce GHG emissions as published by the WHO and HCWH (2009). All the green initiatives discussed under the seven opportunities have been shown to be efficient in reducing GHG emissions. Green initiatives that are easy and quick to implement and that require a low capital investment, seem to

be preferred. There are also strong indications that the majority of green initiates that are being implemented in hospitals both in the US and Canada, are more focused on cost savings than any other reason. There is also very little evidence that US hospitals have been marketing green initiatives as a competitive advantage in any form, although it is highly advertised.

The biggest barrier for the implementation of green initiatives is the availability of capital, followed by the availability of resources. This is similar for both the US and Canada. Projects with a short payback period seem to be preferred, although projects with a long payback period can result in significant cost savings. Of the different opportunities, energy-saving initiatives and waste reduction initiatives are the two areas that have been receiving the most attention.

In context of the research question that explores on what basis hospitals in Ontario can justify the capital and resource investment needed to implement green initiatives, this literature study reveals four important points. Firstly, it indicates that that the type of green initiatives most likely to be implemented by Ontario hospitals, would be initiatives that are quick to implement, have a high potential for cost savings, require low capital input with a short payback period. The extent of implementation also depends on this, meaning that initiatives with the highest cost savings will be more widely implemented. Secondly, the most prominent business areas where green initiatives are focused, seem to be energy efficiency and waste management. Thirdly, the literature study indicates that the primary motivation for implementation of green initiatives is cost savings. Fourthly, apart from waste management, there is no substantive legislation that exerts pressure on hospitals in Ontario to implement green initiatives. From a literature review perspective, this information addressed the first four sub-questions under Section 1.2.1.

The following chapter discusses the differences between the healthcare systems in Canada and the private healthcare system as operated in the USA. It looks at the healthcare funding model in the Ontario healthcare system and identifies the pressure points in the province.

CHAPTER 3
HOSPITAL FUNDING IN ONTARIO

3.1 INTRODUCTION

Hospitals in Ontario are operating in a public healthcare environment. This means that residents in Canada receive free health care and the Canadian government funds the hospitals. This is a completely different environment to the one in which hospitals in the US operate. Hospitals in Canada are not allowed to compete with each other in a for-profit environment. However, hospitals in the US compete directly with each other to attract patients and thereby increase their revenue. The more patients a hospital in the US treats, the more revenue it generates. However, if a hospital in Canada decreases its patient load, its expenses will be lower and it will be more profitable.

The business environment surrounding Ontario hospitals is important to understand in order to address sub-questions (v) and (vi) of the research questions under Section 1.2.1. These two sub-questions explore the perceived return on investment of green initiatives as well as the possibility of increasing revenue to Ontario hospitals based on the implementation of green initiatives.

The way that hospitals in Canada are funded, regulated and managed, will have a profound influence on the decision to implement and manage green initiatives. It is therefore important not to only understand what the funding model looks like, but also what the financial challenges are that Ontario-based Canadian hospitals are facing. The financial challenges are indicators whether there are viable business cases for implementing green initiatives in these hospitals.

This chapter investigates the various funding models available to hospitals in Ontario. It firstly explains the way hospitals are governed and then offers examples to demonstrate the options available to hospitals to access different revenue streams. It concludes by looking at four different environmental competitive strategies and evaluates how applicable each strategy is to hospitals in a public healthcare hospital environment.

3.2 THE FUNDING MODEL FOR HOSPITALS IN ONTARIO

3.2.1 Hospital governance

The funding model for hospitals in Ontario is related to the way hospitals operate. The governance and financing of Ontario hospitals are explained on the Ministry of Health and Long-Term Care (MOHLTC) website (Ontario Ministry of Health and Long-Term Care, 2009a). Hospitals in Ontario operate as private, not-for-profit companies that are governed by a board of directors under provincial regulations. It is therefore governed mostly under the Corporations Act. A hospital is responsible for its own management and is accountable to the ministry for the use of its provincial grants.

There are 225 individual hospital sites in Ontario. Of these, 155 hospitals are corporations and 77 are under umbrella corporations. There are four different groups of hospitals in Ontario: Public, private, federal and cancer care. There are eight private hospitals that are allowed to provide private health care under the Private Hospitals Act. These hospitals still receive funding from the Ontario government. These hospitals are legacy institutions from before 1973 when the last licences were issued to for-profit hospitals.

Hospitals are classified according to Regulation 964 – Amended to O.Reg. 321/01 (Ontario Ministry of Health and Long-Term Care, 2009b). It stipulates the following: “Hospitals are classified as general hospitals, convalescent hospitals, hospitals for chronic patients, active treatment teaching psychiatric hospitals, active treatment hospitals for alcoholism and drug addiction and regional rehabilitation hospitals”.

Under this regulation, hospitals are further graded and listed in 22 categories. The classification of a hospital is an important factor for hospitals, since certain classifications mean that they would qualify for additional funding from the ministry.

As explained previously, hospitals are accountable to the provincial government and must operate within the provincial regulations. The Public Hospitals Act, with its associated regulations, provides this framework in Ontario. The operational policy for hospitals is developed by the MOHLTC. The ministry also monitors operating plans and annual variance reports to ensure hospitals are accountable legally and financially. The operating plans for each year explain to the ministry how the hospital intends to run the facility for the next year. The ministry must approve the operating plan before a hospital can change any service they provide.

Every hospital allocates money from its budget according to its own priorities to best address the needs of the community.

3.2.2 Government funding of Ontario hospitals

Hospitals in Ontario are funded mainly by the provincial government. This is regulated by the Public Hospitals Act (ServiceOntario, 2010). The payments from the provincial government to hospitals constitute approximately 85 percent of their total funding, while the remaining 15 percent is obtained through allowed private charges and other revenue streams like charitable foundations (Ontario Ministry of Health and Long-Term Care, 2009a).

The current system that is in use to fund hospitals, is known as a global (or base) funding model. In this model, hospitals receive a budget that is based on past allocations with adjustments to compensate for changes in costs and inflation. There is also special programme funding available for new programmes or expansions of existing programmes. An example of this would be the expansion of a renal dialysis unit.

Apart from this, there is also separate funding available specifically for capital construction projects. This would mainly be used for expansion projects in hospitals. Under the Public Services

Act, point 5: Payments to hospitals, it stipulates that the minister may pay grants, loans or provide financial assistance to any hospital if he thinks that it would be in the best interest of the public (Ontario Ministry of Health and Long-Term Care, 2009a).

There has been much public criticism of the current hospital funding model (Cluett, 2010; The Sault Star, 2008; OHA, 2007). One of the problems is that hospitals are finding it difficult to operate within the allocated budget that does not take into account factors like demographics, activity, services and other factors that may affect higher spending. In an interview with a local radio station, Tom Closson, President of the OHA, explained the problems as follow (570 News, 2010):

i) At the end of 2010, 61 of the 155 hospitals in Ontario had a budget deficit.

ii) The province-wide shortfall for the 61 hospitals in 2010 was $107 million.

iii) The average hospital budget increase in 2010 was 1.5 percent and 2.1 percent the year before, which is insufficient to compensate for inflation.

iv) The Ontario government has a shortage of funds in the healthcare system. The government deficit projection for 2011/2012 is $16.3 billion (Ontario Ministry of Finance, 2011a: 143).

Looking at the Ministry of Finance's 2011 budget for healthcare spending, it does not look as if this trend will change very soon. The 2011 provincial budget allocated 38 percent or $47.6 billion of their total expenses to health care in the province. As is evident from Figure 3.1, this is more than double that of the closest next largest category, which is education.

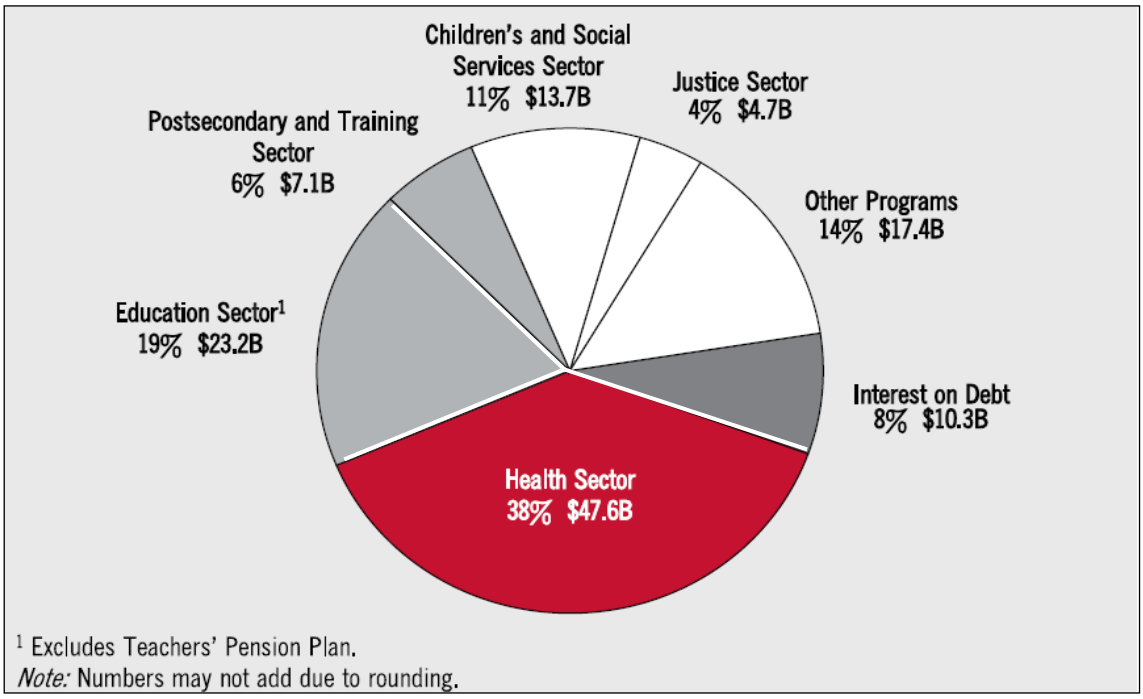


Figure 3.1: Composition of total expense, 2011-12, Ontario province budget

Source: Ontario Ministry of Finance, 2011a: 232.

However, it is almost certain that this will not be enough to fill the gap in funding. For this reason, the Ministry of Finance has allocated between $600 million and $800 million over the next three years to assist hospitals with working capital, while managing their inherited debt. Further plans to save $1.5 billion in efficiencies in various programmes, including $700 million from the healthcare system, have also been included in the budget (Ontario Ministry of Finance, 2011a: 63). However, there is no evidence that the government is planning any significant spending on promoting sustainable health care through green initiatives.

3.2.3 Private funding of Ontario hospitals

Ontario hospitals can raise additional funding through a variety of different private revenue streams. This differs from hospital to hospital. A good example of how private funding can be raised, is the Hospital for Sick Children in Toronto, Canada. This is a large research hospital that has access to additional funding due to its research capability. Figure 3.2 shows the sources of operational funding, which was $641 million for 2010/2011. As can be seen, this hospital raises 31 percent of its annual funding through alternative means. As a result, the Ministry of Health is just contributing 67 percent of the annual funding (Hospital for Sick Children, 2011: 12).

The SickKids Foundation plays a significant role in raising funds. In 2010-2011, this foundation had a record-breaking year where they made an investment of $57.9 million in research, learning and children care. Next to the government, this foundation is the largest funder of child health research in Canada (Hospital for Sick Children, 2011: 15). The SickKids Foundation is responsible for raising nine percent of the total funding of the hospital, equating to $57.8 million.

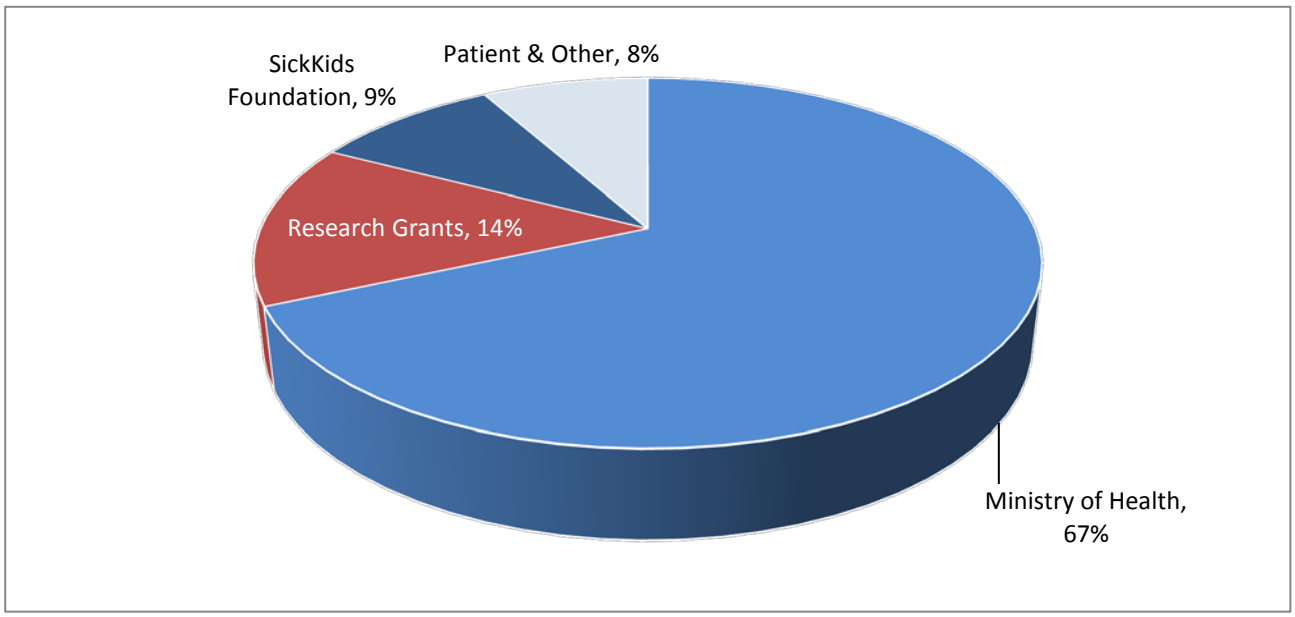


Figure 3.2: Sources of operational funding for the Hospital for Sick Children.

Source: Hospital for Sick Children, 2011: 12.

Another, even more significant source of revenue for the Hospital for Sick Children, is research grants, which contributes 14 percent to the total funding of the hospital. The research that is conducted at the hospital is funded through grants, but the intellectual capital that it creates, is an additional source of revenue to the hospital. In 2010-2011, the SickKids Corporate Ventures reported 35 invention disclosures, 34 patent applications, 183 patents issued, created two spin-off companies, granted 99 active licences and raised $3.8 million in licensing revenue. The total make-up of the research funding is shown in Figure 3.3. For non-research hospitals, this source of revenue will not be available.

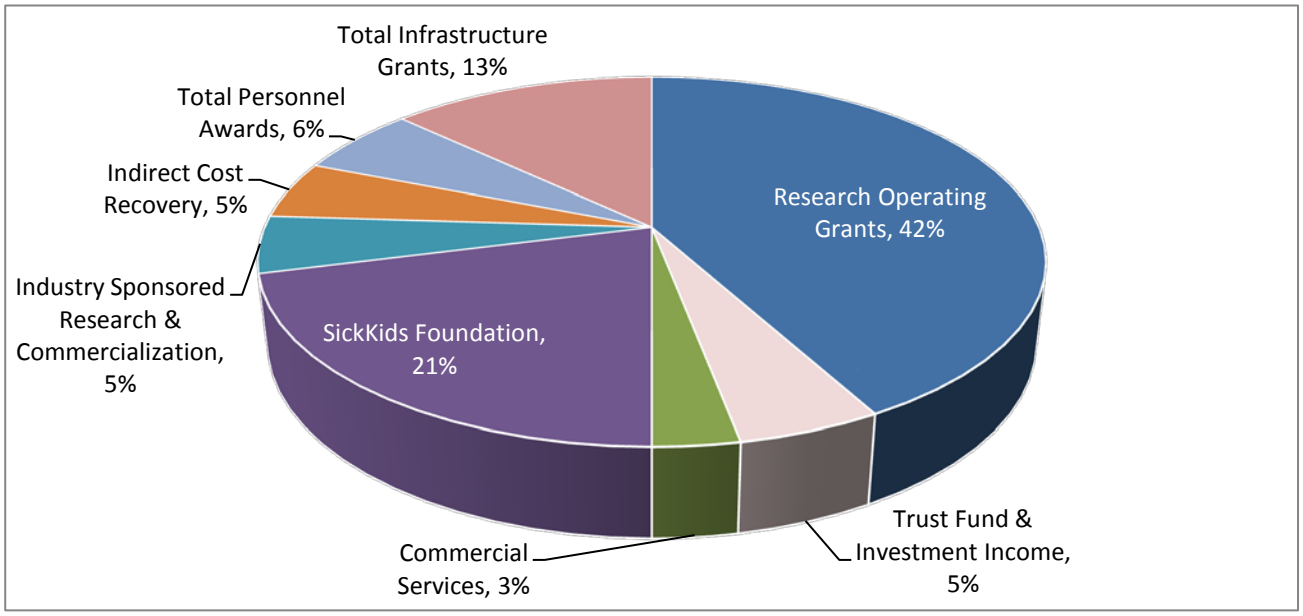


Figure 3.3: Sources of research funding for the Hospital for Sick Children

Source: Hospital for Sick Children, 2011: 12.

Of particular interest is how hospitals raise money for capital funding. In the context of green initiatives and LEED-certified building construction, this hospital started construction of a $400 million project that is financed by donations to the SickKids Foundation by Canada Foundation for Innovation. In general, the make-up of capital funding is shown in Figure 3.4. It is evident that the Ministry of Health contributes very little to capital projects and that any capital projects are mostly self-funded.

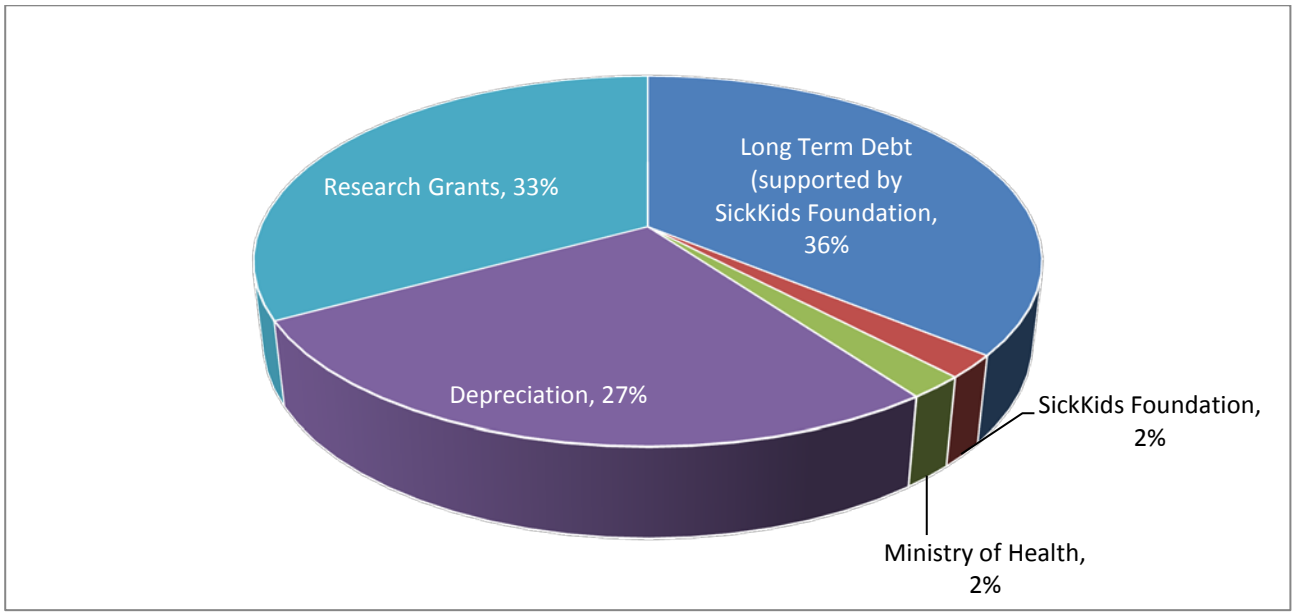


Figure 3.4: Sources of capital funding for the Hospital for Sick Children

Source: Hospital for Sick Children, 2011: 12.

The implication of the low government funding of capital projects is significant. Although the Ministry of Health and Long-Term Care has to approve every new project for a hospital, the hospital management compiles the plans and decides how the funds will be allocated. It is therefore at the discretion of the hospital management whether they allocate money to include LEED certification in a new building or to an alternative energy project. In a situation where nearly 40 percent of all hospitals in Ontario have a budget deficit, it is more likely that funds would be allocated to urgent issues like service delivery and availability of beds.

3.2.4 Comparing Canadian and US hospital revenues

As discussed under Section 3.2.2, there are very few opportunities for hospitals in Ontario to increase revenue, simply because they are not allowed to compete in a for-profit environment. The revenue is capped at around 85 percent of their total expenses, meaning that they have to make up the deficit through charitable foundations and other non-competitive means. Still, hospitals in Ontario are constantly operating at close to 100 percent bed occupancy (Ontario Health Coalition, 2011: 8). This is an indication that there is a shortage of hospital facilities and subsequently, a shortage of bed availability in Ontario.

When comparing hospital budgets and revenue potential in the US to Canada, the differences are obvious. Table 3.1 compares two hospitals that provide a similar range of medical services, including cardiology.

Trillium Hospital is based in Mississauga, Ontario while Hartford Hospital is based in Connecticut, US. Comparing the two facilities from an operational perspective, Trillium Hospital has much more activity in outpatient visits and surgical procedures, while Hartford Hospital has higher inpatient and

emergency visits. Trillium has nearly eleven percent fewer beds than Hartford. When comparing operational revenues, Trillium has to manage with less than half of the revenue available to Hartford, which is also an indication how expensive healthcare provision is in the US. Hartford's revenue is directly related to the number of patients that it is treating, while Trillium's revenue is based on an increase from the previous year plus special funding for projects. For 2010, Trillium Hospital received a seven percent increase because it included a post-construction plan and cardiac funding (Trillium Health Centre, 2010). The increase for Trillium Health Centre from 2010 to 2011 was just 3.7 percent (Trillium Health Centre, 2011). In comparison, Hartford Hospital's revenue increased by eleven percent from 2009 to 2010, and this excluded any revenue from health insurance. This is a strong indication that Ontario hospitals will be under more pressure to reduce operating costs than their US counterparts.

Table 3.1: Comparative income statements between Trillium and Hartford Hospitals

	Trillium Hospital (ON, Canada)		**Hartford Hospital (Connecticut, US)**	
	2010	**2009**	**2010**	**2009**
Inpatient admissions	32488	31358	41265	41188
Outpatient visits	300595	288601	94251	95818
Emergency visits	79408	77737	90108	95405
Surgical procedures	36375	35688	26442	26104
Beds	774	781	867	867
Patient income	**360**	**335**	**800**	**723**
Other agencies and patients	45	42	0	0
Other income and investment income	25	26	131	106
Amortization	7	6	0	0
Donations	0	1	0	0
Special programs	16	17	0	0
Total operational revenue	453	429	932	830
Total expenses	451	427	920	823
Excess revenue	-4	-5	13	5
Health insurance funding	0	0	1901	1744
Nett revenue	-4	-5	1914	1749

Source: Compiled from Trillium Hospital Annual Report 2009/10 (Trillium Health Centre, 2010) and Hartford Annual Report 2009/10 (Hartford Hospital, 2011).

One of the major differences is the way that the two hospitals fund capital projects. Trillium Hospital has to present a business case to the MOHLTC, and if approved, receives the money from the government. Taken into account the current budget deficit and the pressure on health care in Ontario to save $700 million in efficiencies in health care, this would not be an easy process. Alternatively, Trillium will have the option to raise money through its foundation. In the case of Hartford Hospital, raising capital will be managed through a conventional business process, being budgeting, board approval and private financing (or use of own capital).

3.3 THE BUSINESS CASE FOR GREEN INITIATIVES

As discussed under Section 1.4, Orsato (2006) made the point that a business should be clear as to why it is implementing green initiatives. Unless there is a definite business case for spending money on green initiatives, it may not be the most appropriate thing to do with the available money. In a global survey done in 2008, senior executives around the globe were interviewed to understand their views on green marketing and green initiatives in the corporate world (PricewaterhouseCoopers, 2008). Some of the results are summarised in Figure 3.5.

This survey was conducted in the technology manufacturing industry, which is substantially different from the hospital industry. However, there were a number of interesting observations. While healthcare providers in general are aware that they are potentially causing harm to the environment (see Section 2.2.5), this does not seem to be the case for the technology industry. In this survey (PricewaterhouseCoopers, 2008), nearly 71 percent of respondents were of the opinion that their companies are doing little harm to the environment. If a whole industry believes that they are not doing much harm to the environment, it will be very hard for them to implement green initiatives based on corporate social responsibility.

Another observation from this survey (PricewaterhouseCoopers, 2008) is that 71 percent of the senior executives said that, although clients would like to purchase green products, they are not prepared to pay for it. This is a strong indication that this industry will find it difficult to follow an eco-branding strategy (Orsato, 2006: 134). This raises the question whether green marketing is a viable business strategy in any industry. This obviously depends on the product type, but in general is dictated by the buying behaviour of the consumer.

An article published by Chen and Chai (2010: 27) looked at consumer attitudes towards the environment and green products. This study found that an individual's personal norm is the most important driver towards green products; however, the protection of the environment did not contribute significantly to a consumer's attitude towards green products. It also found that consumers believe that it is government's responsibility to preserve the environment (Chen & Chai, 2010: 30). Since hospitals in Canada are controlled and funded by the government, this may be a significant factor in the way that people think about green initiatives in hospitals.

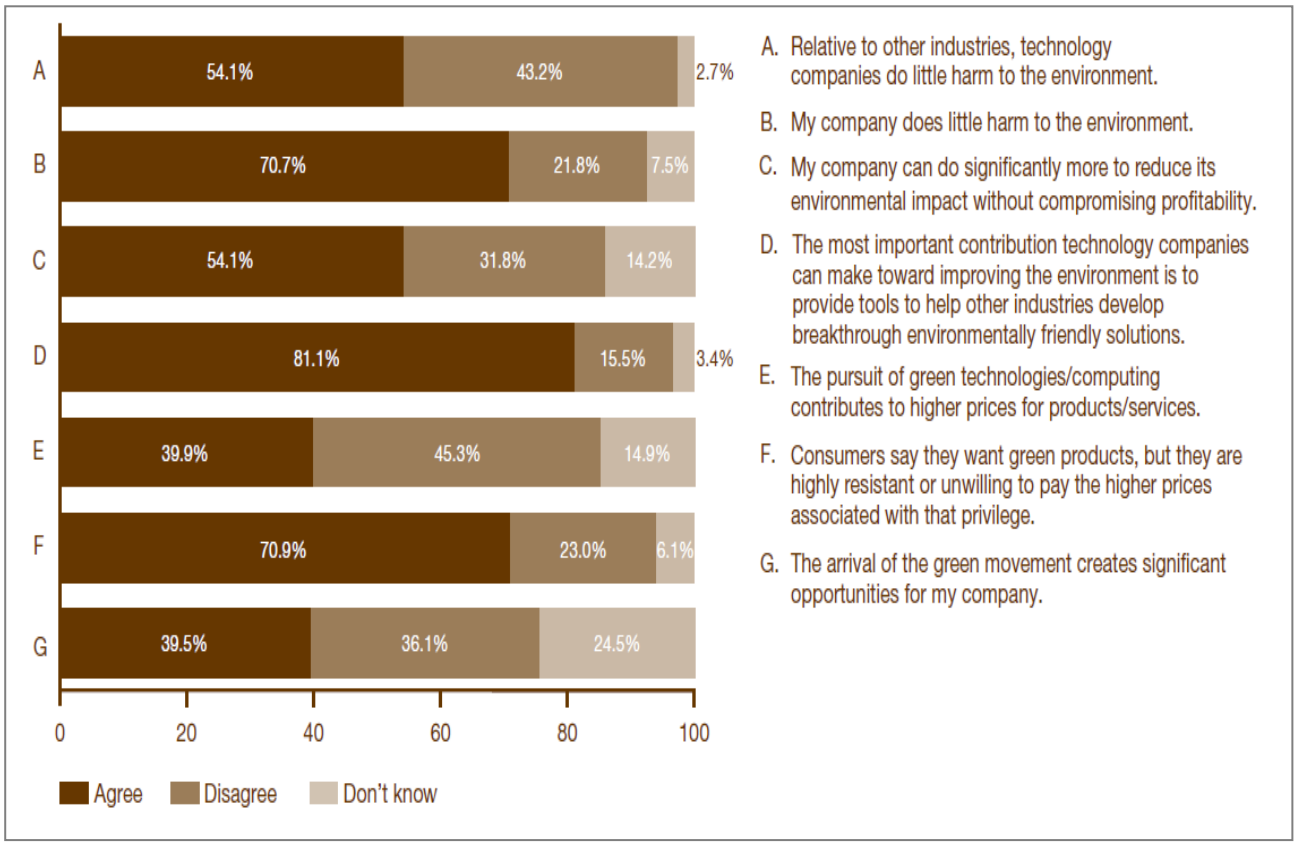


Figure 3.5: PWC survey results conducted under technology senior executives

Source: PricewaterhouseCoopers, 2008: 54.

If a company wants to sell its green products or services at a premium, there should be consumers that are willing to pay for it. In a survey conducted under Canadians, it was found that 37 percent of consumers were willing to pay more for a product that is environmentally friendly (Ledger Marketing, 2011: 38). However, it does not quantify how much more consumers are prepared to pay. While this is all relevant for hospitals in the US that can potentially sell their services and products at a premium as part of a green business strategy, this is not the case for hospitals in Ontario. Consumers in Canada receive free health care and do not pay for any basic medical services. It is questionable whether patients would be prepared to pay a premium when treated in hospitals that have implemented green initiatives. There is little or no evidence that hospitals in the US are actively marketing their green initiatives in a way to increase patient numbers and revenues as well. Hospitals that have implemented green initiatives, at most advertise it on their websites and sometimes in the media. This may be the early evidence of a 'beyond compliance leadership' strategy (see Section 1.4.2).

Ideally, hospitals in the US that are implementing green initiatives should focus on the value proposition to the patient (WHO & HCWH, 2009: 6). However, hospitals in the US also have funders as clients, whose perception of the value is equally as important. If a hospital can also sell better patient outcomes as health benefits to the funders, they can obtain 'preferred provider'

status, which would further increase patient numbers and subsequent revenues. However, this would be of little value to hospitals in Ontario.

Selling green products is not necessarily the only business strategy that can be linked to green products and processes. A business can increase its resource productivity by better utilising waste in the form of an increase in yields or a better utilisation of by-products (Porter & Van der Linde, 1995). Reducing operating costs can result in efficiencies that can eventually be of benefit to the consumer. This is potentially significant for hospitals in Ontario as they are generally limited on the amount of funding they receive from the government. In addition, hospitals are operating at full capacity and this is resulting in a general shortage of beds in the province. A reduction in operating costs by implementing green initiatives can potentially make available surplus funds that can be utilised to increase capacity.

In any company, increasing the bottom line is a priority. This can be done by increasing revenue or decreasing costs. Figure 3.6 shows the response by senior executives interviewed globally in a PricewaterhouseCoopers (2008) study. They were asked to identify the most important factors for making a decision to implement competitive environmental sustainability strategies. The choices that they could choose from are listed from A to I in Figure 3.6.

Referring back to Section 2.2.3, in hospitals in the US. where operating margins are in the order of four percent, every one dollar savings on the bottom line is the equivalent of an increase of $25 in revenue. The focus on cost savings is evident in the technology manufacturing industry as well. It is no surprise that the potential to save costs is the most important factor when deciding whether to implement green initiatives.

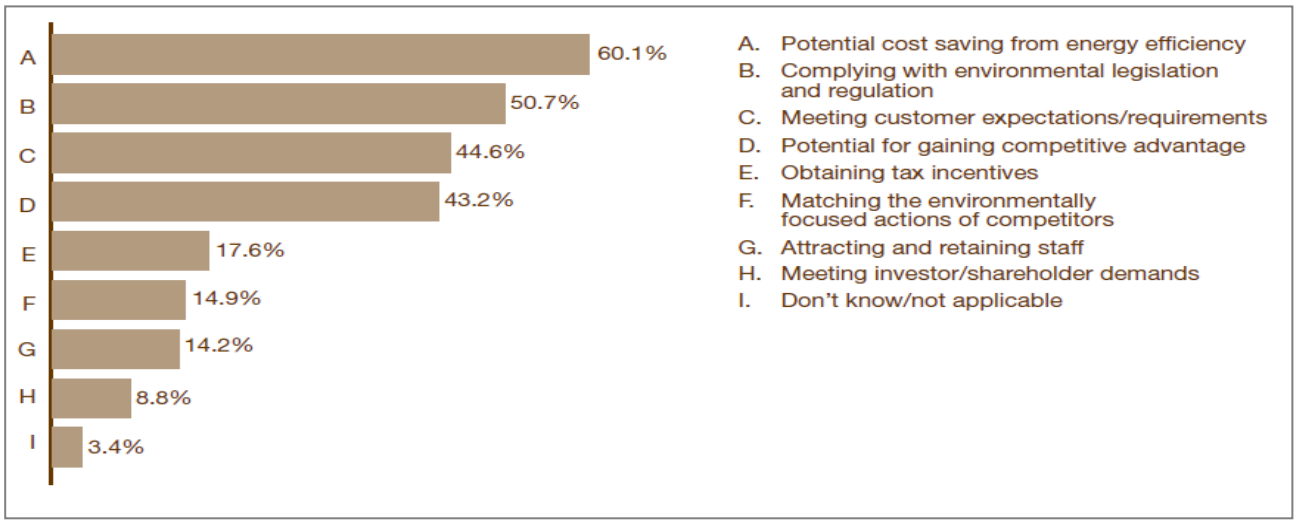


Figure 3.6: Most important factors for implementing competitive environmental strategies

Source: PricewaterhouseCoopers, 2008: 57.

The second most important factor is legal compliance, followed by customer expectations and fourth, the potential to gain a competitive advantage. This supports two of the three reasons stipulated by Bansal and Roth (2000), who said that a company implements green strategies for three reasons: competitiveness, legitimation and environmental responsibility. In this case, competitiveness is not necessarily selling more green products, but rather reducing costs.

The question remains whether there are opportunities for hospitals in Ontario to apply any environmental competitive strategies in their current environment.

3.3.1 Eco-efficiency strategy in Ontario hospitals

Referring to Section 1.4.1, an eco-efficiency strategy can be used when a company needs to reduce cost as well as the environmental impact of its processes. Of all the strategic options that are available, this option is the most obvious choice for hospitals in Ontario. The strategy revolves around the ability to better utilise waste and to be more operationally efficient, thereby reducing waste and saving costs. Orsato (2006: 132) was of the opinion that savings through eco-efficient strategies can be generated in virtually every company and would make business sense especially in industries where it is unlikely that consumers would pay for environmental improvements. Hospitals can use this strategy to reduce costs off their bottom line, which is equivalent to increasing sales (Environmental Leader, 2009).

3.3.2 Beyond compliance leadership strategy in Ontario hospitals

'Beyond compliance leadership' is a strategy for companies that believe that investing in environmental initiatives and publicising their efforts, will give them a competitive advantage. At first, it seems that the importance of gaining a competitive advantage for hospitals in Ontario would serve no purpose; however, there are unique situations where this may be useful. Referring to Section 3.2.2, hospitals raise up to 15 percent of their revenue through foundations and other fundraising efforts. It would therefore be an option to use the 'beyond cost leadership' strategy as a way to attract additional funding through the foundations. However, to achieve this, hospitals may need to get ISO 14 001 accreditation as well as LEED certification, and may even need to implement green initiatives which would not necessarily save costs. This again poses the problem that funding to get to that stage, would be difficult to obtain. According to Orsato (2006: 134), initiatives that go beyond compliance will eventually have an effect on consumer behaviour, especially if they have an effect on the image of the company.

3.3.3 Eco-branding strategy in Ontario hospitals

Of the four available strategies, this is the least likely strategy that a hospital in Ontario would follow. The principle of this strategy is to brand a product as 'ecologically differentiated'. In order to be successful with this strategy, there are three pre-requisites. The first is that the consumer must be prepared to pay for the cost of a product that is ecologically differentiated. The chance that patients in Ontario would be willing to pay for any part of health care that is usually free is highly

unlikely. The second pre-requisite is that the consumer must have access to accurate information regarding the environmental performance of the product, and the third is that it must be difficult for a competitor to copy the differentiation (Orsato, 2006: 134). This is not an easy strategy and most likely not a strategy that hospitals in Ontario should or could follow. According to Orsato, this is definitely not a strategy that can be followed by all companies.

3.3.4 Environmental cost leadership strategy in Ontario hospitals

An 'environmental cost leadership' strategy has an obvious challenge. Companies that want to follow this strategy have to produce eco-friendly products that can be competitive on environmental performance, but also have to be available at a lower price that conventional products (Orsato, 2011: 135). In the Ontario hospital context, this would mean that hospitals will have to become super-efficient using green initiatives, to the extent that their operating costs reduce to the level that it can provide its services to the government at a much reduced rate than other hospitals. Even though this is possible in theory, it is questionable whether such institutions would benefit from a strategy like this, given the financial pressures on the government. It is more likely that surplus funds would eventually be redirected to fill the funding gaps.

3.4 NON-COMPETITIVE STRATEGIES

When considering the difficulty for Ontario hospitals to operate in this environment given the complex regulatory and funding environment, there is an obvious case to consider non-competitive strategies. In this context, a non-competitive strategy would mean collaboration between hospitals to obtain a common goal (Hamilton, 2011). There are two key concepts that are important in order for this to be successful. Firstly, since Ontario hospitals are not-for-profit companies, they are already using non-profit strategies for their overall strategic planning. Secondly, green initiatives could be positioned as a driver of effectiveness and could be focused towards reaching the 'mission accomplished' stage, rather than 'outperform rivals' as seen in for-profit companies (Sheehan, 2005). A collaborative effort to reduce GHG emissions will be much more effective than when each hospital operates in isolation. It will also reduce the free rider problem that was referred to under Section 2.2.3. The Gundersen Lutheran hospital that collaborated with the City Brewery and the La Crosse County landfill as discussed under Section 2.2.3, is a good example of such a collaboration.

The non-profit status of Ontario hospitals means that their effectiveness should be seen in terms of a mission (Sheehan, 2005: 4) rather than profitability. Typically, non-profit organisations will have missions that revolve around making a difference in the world and their aim is to close the mission gap (Sheenan, 2005: 5).

As was seen in the WHO and HCWH (2009) document, as discussed under Section 1.1, this document guides hospitals towards a bigger mission, being to care about the planet and to do no harm to humanity. To be more specific, the WHO and HCWH (2009) document appeals to hospitals to take the reduction in GHG emissions serious, and discusses the three co-benefits of the mission.

i) The first is the health co-benefits (WHO & HCWH, 2009: 6). This means that if the global carbon footprint can be reduced, the effects of air pollution and water contamination will also reduce, resulting in a more healthy society. This in turn will reduce the pressure on the health system and will therefore improve the quality of medical services.

ii) Secondly, there is economic co-benefits (WHO & HCWH, 2009: 8). These benefits are based on savings that can be obtained on energy bills.

iii) The third co-benefit is social co-benefits (WHO & HCWH, 2009: 9). Social co-benefits mean that healthcare workers can act as change agents in society and influence other parties positively. To this extent, the mission gap for environmental sustainability has already been exposed.

In order to close this mission gap, green initiatives would be essential tools. If this is seen, in conjunction with the Orsato model for competitive environmental strategies (Orsato, 2006) that is focused on a competitive environment, there is a strong argument that certain of these strategies could still be useful in both a non-profit and non-competitive environment. A number of competitive driving forces can have a considerable impact on non-competitive business strategies (Sheehan, 2005: 6). Considering more specifically the eco-efficiency strategy discussed under Section 3.3.1, this strategy would be perfect to use to fill the mission gap of Ontario hospitals. The eco-efficiency strategy addresses two very important issues for Ontario hospitals, being cost reduction and reducing their carbon footprint.

3.5 CONCLUSION

The current funding model is not ideal since nearly 40 percent of hospitals end up with a budget deficit. The Ontario government is under financial pressure to work away its current $16 billion deficit. On average, hospitals receive around 85 percent of their funding from the state, while it raises around 15 percent through charity foundations or other means. Hospitals that are research centres or that have speciality units can get additional funding from both the state as well as from private research grants. Hospitals in Ontario are under pressure to provide services since they are running at an average of 98.5 percent bed occupancy.

The literature review in this chapter addressed a number of important issues that relate to the research question in this study. In assessing on what basis Ontario hospitals can justify the implementation of green initiatives, the availability of funding seems to be a key consideration. Looking specifically at the financial challenges that Ontario hospitals are facing, available capital

influences virtually every aspect of the decision to implement green initiatives. It also has a profound effect on the type of projects that are implemented. It is clear that the Ontario hospital funding model is a major barrier to the implementation of green initiatives that either have a long payback period or that require a substantial capital investment. This is in line with what was found in the literature review in Chapter 2.

Research sub-question (vi) under Section 1.2.1 investigates whether the possibility exists to increase revenue to Ontario hospitals by making use of green initiatives. Based on the literature review, it seems that actual revenue increases are unlikely. However, since budget restrictions are a major problem, certain green initiatives can most certainly reduce the hospitals' operating costs. The result can be that the budget dollars can be stretched which would have a similar effect as an increase in budgets.

The information in this chapter also suggested that the most probable competitive environmental strategy that a hospital in Ontario would follow would be an eco-efficiency strategy. Although variations of 'beyond compliance leadership' and 'eco-branding' strategies would also be possible, it would probably not play a prominent role in Ontario hospitals. In order for hospitals to effectively function as non-profit organisations in a non-competitive environment, it would be important to do proper strategic planning and identify the mission gap. Ontario hospitals as non-profit organisations will be measured more on 'mission accomplished' than profitability. The application of certain competitive environmental strategies in this non-competitive environment may be very valuable.

The following chapter describes the research methodology followed in this research study.

CHAPTER 4
RESEARCH METHODOLOGY

4.1 INTRODUCTION

The province of Ontario, Canada, covers more than 1 000 000 square kilometres, which is more that the areas of France and Spain combined. The province stretches 1 730 kilometres from north to south and 1 680 kilometres from east to west when measured from the furthest points apart. There are 13 200 000 residents in Ontario. The population distribution is 47.1 percent in the Greater Toronto Area, 21.6 percent in Central Ontario, 13 percent in Eastern Ontario, 12.1 percent in Southwest Ontario, 4.3 percent in Northeast Ontario and 1.8 percent in Northwest Ontario (Ontario Ministry of Finance, 2011b: 14). The 227 hospitals in the province are distributed according to the population distribution. The sizes of the hospitals vary from as small as ten beds to over a thousand beds. From a geographical distribution perspective, the only realistic means that are available to conduct research on hospitals in Ontario, would be via e-mail or other electronic means.

All hospitals in Ontario are members of the OHA, which also administers the hospitals' pension plan. The OHA has a full-time consultant who is responsible for driving green initiatives in hospitals. The OHA has also launched a number of initiatives to encourage hospitals to engage in green initiatives, which included making available funding for energy and waste audits. Due to the relationship between hospitals in Ontario and the OHA, it was decided to approach the OHA for assistance in this research project. In addition, the OHA has been working closely with The Canadian Coalition for Green Health Care who is instrumental in sharing green health best practices with hospitals.

This research project was designed as an investigative study, making use of surveys and literature reviews. One population was surveyed through a sample. The sample size was calculated using data made available from the OHA, representing the population of hospitals in the province of Ontario that have implemented green initiatives. The project used primary data from the surveys and secondary data from the OHA. The primary data was obtained from questionnaires and assessed the motivation for the implementation of green initiatives in hospitals. The results were interpreted against the generic competitive strategies as depicted in Figure 1.1.

4.2 THE POPULATION AND SAMPLE

As mentioned under Section 3.2.1, there are 225 hospitals in Ontario, of which 150 operate as corporations. Normally, this would be considered as the population that would be used in a study like this. According to Takata (2011b), every hospital has been implementing some form of energy-saving initiative, but not as part of any green initiatives. However, for this study, only hospitals that have planned and implemented specific green initiatives, would add value to this study. Any

responses from hospitals that have not implemented green initiatives would possibly skew the data. In selecting the population and sample, it was important to ensure that the respondents could complete the questionnaire in full. The only advantage of hospitals that have not implemented green initiatives completing the questionnaire, would be to calculate the incidence of green initiative projects in Ontario. However, this figure is available from the OHA. According to the OHA, there are currently 104 green initiative projects registered with the OHA, representing 72 hospitals (Takata, 2011b). This data already indicates that the incidence of implementing green initiatives in hospitals in Ontario is 32 percent. For this reason, the 72 hospitals that have registered green initiative projects with the OHA, was considered the population.

With the population size known, the sample size was calculated using a statistical sample size calculator (MaCorr, 2011). The following parameters were used:

- Confidence level: 95 percent;
- Confidence interval: 10 percent;
- Population: 72;
- Sample size calculated: 41;

The confidence interval of ten percent was calculated using a confidence interval calculator and using a worst-case scenario of a 50 percent split between answers (MaCorr, 2011).

4.3 THE QUESTIONNAIRE DESIGN

The empirical data in this study was collected using a questionnaire. The questionnaire was designed with the following objectives in mind:

- Design must allow for a high level of compliance (short, precise and simple);
- Data from the questionnaire must allow quantitative as well as qualitative interpretation;
- The questions must specifically address the research questions under Section 1.2;
- The questionnaire must be available in both printed and online versions.

The questionnaire made use of close-ended questions with the option for the respondents to comment or add an option that was not included in the choices. The force-choice questions provided a list of alternatives that the respondents could choose. In addition, the questionnaire also included a quantitative question, rating questions and list questions. The quantitative question was used to identify the size of the hospital and required the respondents to record the number of beds in the hospital. The rating questions required the respondents to rate their views according to a rating scale. The list questions required the respondents to choose between “agree” and “disagree” options.

4.3.1 Test questionnaire

The first version of the questionnaire was distributed to a small group of medical and administrative managers in Toronto. This was done to ensure the following:

- That the intent for the research was clear;
- That the questions were applicable in the context of Ontario hospitals;
- That each question was clear without the possibility of confusion;
- That the questionnaire was not too long;
- That the format and choice of questions would ensure that the data could be statistically analysed;
- That the research question could be answered.

The questionnaire was also sent to two academics at the University of Stellenbosch Business School (USB) for feedback.

Based on the feedback from the test group, a number of changes were made to the test questionnaire to create the final questionnaire.

4.3.2 Final questionnaire

The feedback from the test group on the test questionnaire was evaluated and the following changes were made to compile the final questionnaire:

- Question three: changed to a quantity question rather than selecting between small, medium and large.
- Question four: added to get an understanding of the respondent's view of the concept "green initiatives".
- Question six: option c was changed from "I don't know" to "No, but we are planning one".
- Question eight: was changed to a list question choosing between "agree" and "disagree".
- Question nine: the question was re-stated for clarity.
- Question ten: the restriction on the number of choices that can be selected, was removed.
- Question fourteen: the rating was changed to an individual rating for each option.
- An additional free-typing option, listed as "other", was added to questions 1, 2, 4, 7, 9, 10, 12, 14, 15 and 16.

The final questionnaire was produced in a hard copy format (refer Appendix A) and also converted into an electronic format that was hosted by www.surveymonkey.com.

4.4 DATA COLLECTION

The original intention was to send surveys electronically to the selected hospitals in the population. Since a minimum sample size of 41 respondents was calculated for a ten percent confidence interval, a response rate of 57 percent was required if the questionnaire was sent to all 72 hospitals that make up the population. Research has shown that the response rate on a targeted e-mail survey is around 36 percent (Sheehan, 2001). Therefore, if the response rate were 36 percent then the sample would exist of just 25 responses, meaning that the confidence interval for the data will reduce to 16 percent (MaCorr, 2011). However, an opportunity was presented through the OHA that organised a Green Health Care Conference in Toronto, Canada. The conference was open to staff members in housekeeping, maintenance, capital projects, purchasing, operations, engineering, energy, facilities, finance, environmental services, food services and chief executive officers (CEOs) and board members of hospitals in Ontario. The conference was held on 15 June 2011 and was attended by 50 delegates from all over the province of Ontario, representing 38 hospitals in Ontario.

During the conference, permission was obtained from the OHA and the conference chairperson to address the delegates to explain the objective of the research. Permission was also obtained to distribute hard copies of the questionnaires to the delegates. Completed questionnaires were collected at the close of the conference. Thirty-three questionnaires were returned, representing a 45 percent response rate.

In order to establish whether the conference delegates are a representative sample of the population, it was decided to also approach hospitals that did not attend the conference and compare results. For this, the Canadian Coalition for Green Health Care (CCGHC) was approached. The CCGHC offered to post the electronic questionnaire on their website. Over a period of 45 days, just five responses were received. However, it was decided to ignore these responses because the responses were anonymous and anyone in Canada could complete the survey. It was not possible to verify whether these responses were generated inside or outside the province of Ontario.

The Ontario hospital database is only available to registered members of the OHA. Since the identity of hospitals that have registered green initiative projects with the OHA, as well as the contact details of other hospitals, were not available for the purpose of this study, it was decided to send questionnaires to randomly-selected hospitals in Ontario. This turned out be much harder to achieve than originally anticipated. The Ontario hospital database that is available on the Ontario Ministry of Health and Long-Term Care website, only provides telephone numbers. It also has no e-mail contact details for any hospital on the database (Ontario Ministry of Health and Long-Term Care, 2009a). In addition, when accessing individual hospital websites, no specific e-mail address that could be used for correspondence with a hospital, could be found. Due to time constraints and

limited resource availability, the decision was made to only use the responses collected at the OHA conference.

4.5 DATA ANALYSIS

The data from all questionnaires collected were captured in a Microsoft Excel spreadsheet and all additional information recorded under ‘other’ was inserted as comments in the cells. The scale that was used for questions that required a rating or priority allocation had a range from one to five, where one was the highest rating and five was the lowest rating. This scale was chosen since a first priority is considered to be the highest priority in healthcare. The scales were therefore designed to make it easy to understand for this specific audience. However, this would mean that the item with the lowest average or total would have the highest rating. In order to simplify the processing of the data and to ensure that data was not misinterpreted, a reverse scale was applied to all questions that required a rating or priority allocation. The reverse rating allowed for easy interpretation and logical presentation in graphs. The reverse scale is shown in Table 4.1.

Table 4.1: Reverse scale applied to rating and priority allocation questions

Original rating 1 to 5, 1 = High; 5 = Low/No	Converted to 5 to 1, 5 = High; 1 = Low/No
1	5
2	4
3	3
4	2
5	1

The initial data was analysed by making primarily use of frequency distributions and was presented in graphic format. Based on the observations from this data, the quantitative data was analysed using both descriptive and inferential statistics where applicable. For the purpose of statistical analyses, the alpha number for each question was translated to a corresponding numerical value. A simple translation was used by coding the alpha numeric numbers from ‘a’ to ‘i’ with numbers 1 to 9.

The analysis made use of a number of statistical techniques, which included graphics consisting of pie charts and bar charts as a visual presentation of the data. The statistical calculations used were mainly statistical inference and regression analyses. Questions one and two were used to profile the respondents. The quantitative data in question three was binned and empty bins were ignored.

Any question that had a zero response from any respondent, was ignored in the data analysis. Qualitative comments that were recorded on the survey questionnaires were discussed separately and recorded.

The data was interpreted in such a way that generalisations can be made about the hospital industry in Ontario, with specific focus on hospitals that are planning to, or who are already implementing green initiatives.

4.6 CONCLUSION

Although the initial intention to survey Ontario hospitals via e-mail electronic questionnaires did not realise, the opportunity presented at the OHA conference on Green Health Care provided the opportunity to survey 33 of the 72 hospitals that have registered green projects with the OHA. This sample size is smaller than the minimum sample size that was calculated to analyse the results at a ten percent confidence level. Additional hospitals could not be sampled due to a lack of information, time and resources. However, the sample size of 33 hospitals is still large enough to provide meaningful results. The questionnaire design was functional and pre-tested and was specific to the research questions.

The research methodology used in this study captured responses that addressed the research question very specifically. The research question under Section 1.2.1, as well as all the sub-questions, was incorporated in the questionnaire. In addition, the sample audience was all respondents who attended the OHA conference and who represented hospitals that are involved in green initiatives in some way.

The results and the findings of the study are discussed in the next chapter.

CHAPTER 5
RESULTS AND FINDINGS

5.1 INTRODUCTION

The results of the survey are mainly presented in a visual format. The data of each question is presented in a graph and discussed separately. At the end of this chapter, the overall results are discussed with a specific focus on the research questions. To recap, the specific research sub-questions to be answered, as formulated under Section 1.2.1, were:

i) What is the extent of current green initiatives implemented in hospitals in Ontario?
ii) What business areas in hospitals are currently focusing on green initiatives?
iii) What is the primary motivation for implementing various green initiatives in hospitals?
iv) How strong are the external pressures to implement green initiatives?
v) What is the perceived return on investment of green initiatives?
vi) Is there a possibility to increase funding (revenue) to hospitals based on the implementation of green initiatives?

The results were interpreted in light of the literature study done in Chapters 2 and 3.

5.2 THE PROFILE OF RESPONDENTS

5.2.1 Job profiles

The respondents were all employees of hospitals in Ontario who attended the OHA conference on Green Health Care on 15 June 2011. As delegates representing their hospitals at the OHA conference, they can be seen as individuals who have a better understanding of green initiatives in the hospital than the average employee.

The results show that 86 percent of the respondents are in managerial positions, of which 32 percent are in senior managerial positions, either as Vice President/Director or CEO/Managing Director/President (Appendix B, Figure B1). The respondents recorded under ‘other’ have diverse responsibilities. They represented 14 percent of the respondents and were a Technician, Sustainability Coordinator and Engineer.

The overall profile of the respondents indicates that the survey was conducted more on a managerial level that on a technical level. Therefore, this profile produced a more strategic response rather than a pure operational response. It also means that the respondents were better informed about the positioning and intent of green initiatives in the hospital.

The high percentage of senior managers that attended the green health care conference is also an indication that green initiatives is something that is managed on a senior level and not left to junior or technical staff.

5.2.2 Profile of hospitals represented

A total of 33 hospitals were represented in this sample, which equal 46 percent of all the hospitals that have registered green initiative projects with the OHA. The frequency distribution of the different sizes of the hospitals is shown in Figure 5.1.

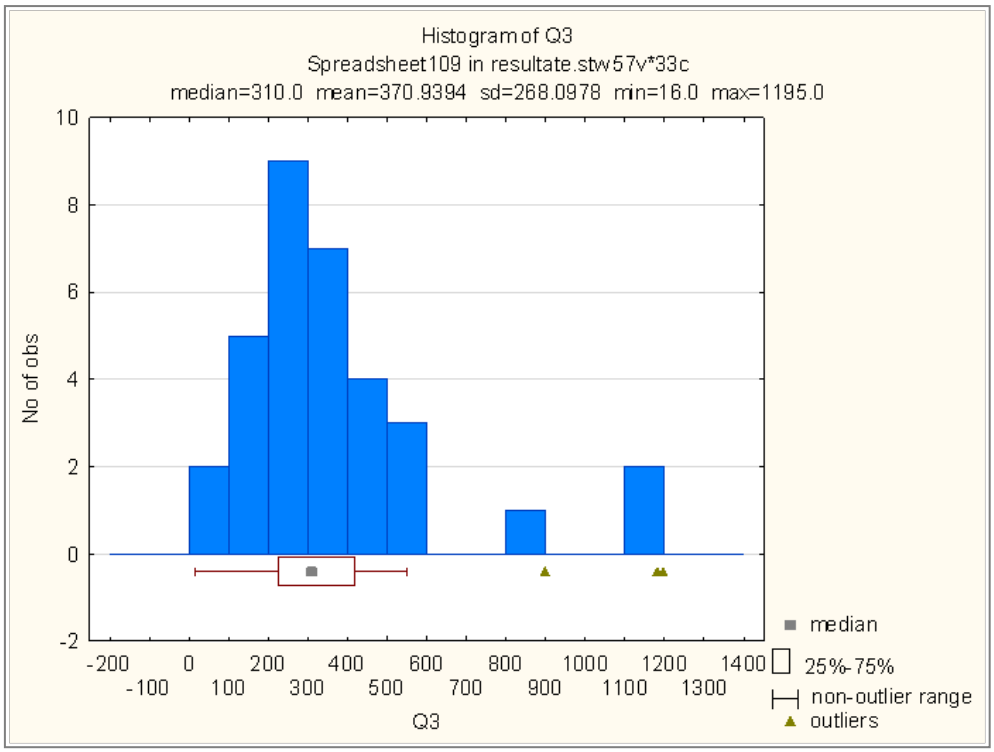


Figure 5.1: Frequency distribution of the hospital sizes of the sample

The majority of hospitals were small to medium-size hospitals (73%), with 500 beds or less and a mean value of 370 beds. There were three hospitals represented that all had 800 or more beds. The size of hospitals can play a significant role in a survey like this. A small hospital may have much less flexibility and access to funds for green initiatives than a large or very large hospital. It would also be easier for large hospitals to raise additional funding through foundations simply because of their higher visibility in society. The distribution of hospitals in this sample indicates that the results are more representative of hospitals with less than 600 beds.

5.2.3 Correlation between hospital size and the type of green projects

The difference in focus on green initiatives between a small and large hospital is likely to be significant as well. Therefore, an F-test and a Mann-Whitney test were conducted on the data to determine whether there was a relationship between the size of a hospital and the type of green initiatives implemented.

The null hypothesis formulated was that the mean of the population that implemented a specific green initiative would be equal to the mean of the population that did not implement that green initiative for a specific hospital size. The alternative hypothesis formulated was that the mean of the

population that implemented a specific green initiative would not be equal to the mean of the population that did not implement that green initiative for a specific hospital size. The formulations therefore were:

$H_0: \mu_1 = \mu_2$

$H_1: \mu_1 \neq \mu_2$

The tests were conducted at a 95 percent confidence interval. The results are summarised in Table 5.1.

Table 5.1: Correlation between hospital size and type of projects

Green initiative	F-Test p-value	Mann-Whitney p-value
Energy efficiency	0.61	0.88
Alternative energy	0.44	0.47
Waste	0.57	0.82
Water	0.02*	0.03*
Food	0.27	0.36
Transportation	0.02*	0.10
Building	0.73	0.78

* indicates statistical significance at a 95% confidence level

The results from Table 5.1 show that we fail to reject the null hypothesis in all instances except for ‘water’ and ‘transportation’. With these two initiatives, we reject the null hypothesis in favour of the alternative hypothesis. The means of the two populations that implemented water and transport initiatives are not equal.

The graphical outputs of the water and transportation results are shown in Figures 5.2 and 5.3. The residual plots and detail results for the data in Figures 5.2 and 5.3 are shown in Appendix B, Figures B.3 and B.4. These graphs show that the larger the hospital, the more likely it is to implement water and transportation green initiatives.

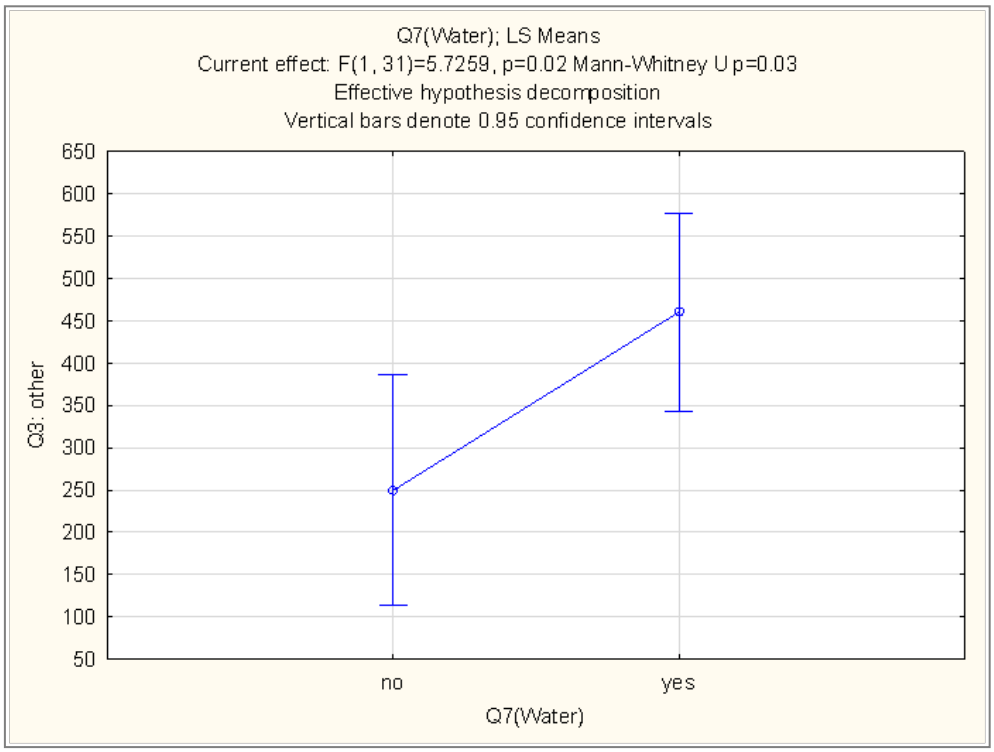


Figure 5.2: Correlation between hospital size and water green initiatives

Similarly, Figure 5.3 shows that the larger the hospital, the more likely it is to implement transportation green initiatives.

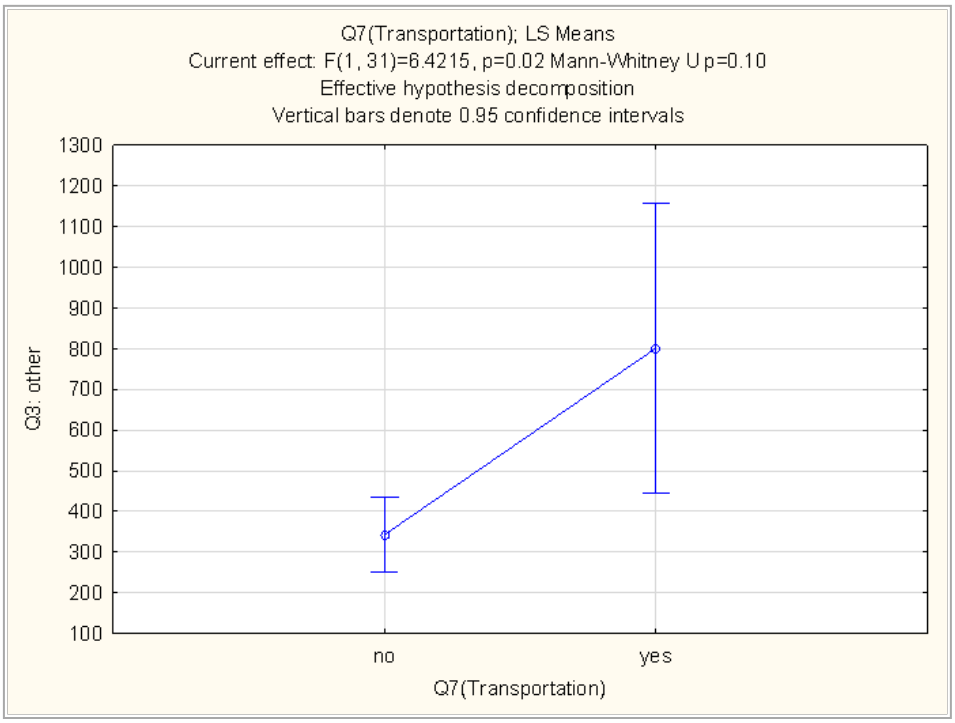


Figure 5.3: Correlation between hospital size and transportation green initiatives

We can therefore infer that the larger the hospitals in Ontario, the more likely it is to implement water and transportation initiatives. We can also infer that all hospitals in Ontario are equally likely to implemented energy efficiency, alternative energy, waste, food and building green projects, since we have failed to reject the null hypothesis on these green initiatives.

5.2.4 Correlation between hospital size and the number of green projects

The correlation coefficient between the size of the hospital and the number of green projects that have been implemented, was determined as well. The Pearson Correlation R was determined, using the size of hospitals recorded in question three and the number of projects recorded in question seven (Table 5.2).

Table 5.2: Correlation between hospital size and number of green projects

Pearson Correlation R	Hospital size	Number of green projects
Hospital size	1	
Number of green projects	0.3998	1

The correlation coefficient of 0.4 is an indication that there is a moderate correlation between the size of the hospital and the number of green projects.

5.2.5 Interpreting the relationship between hospital size and green initiatives

The results in Sections 5.2.3 and 5.2.4 have an important implication on the research question. If seen in conjunction with the literature review in Chapters 2 and 3, water and transportation are two initiatives that are not generally considered as having a high impact on costs savings. However, if the size of the hospital increases, both these initiatives could contribute significantly to the operating costs. In small hospitals, these projects will typically have a very small contribution to operating costs and are therefore a low priority compared to other green initiatives.

The finding that there is no difference in the rest of the projects implemented and the size of the hospitals, is also significant when the type of projects is considered. Energy savings, alternative energy and waste projects are implemented across all sizes of hospitals. These projects have the biggest impact on operating costs and will have a substantial impact on any hospital, regardless of its size. Food and building projects also showed no differentiation between the sizes of the hospitals. These two initiatives are very different in their capital requirements and complexity to implement and the motivations would probably vary widely from hospital to hospital.

The finding that larger hospitals tend to implement more projects than smaller hospitals indicates that larger hospitals potentially have a larger need for cost savings, and would therefore implement any project that would result in savings. It also indicates that larger hospitals potentially have more resources available to implement green initiatives.

5.3 MEASURING THE UNDERSTANDING OF 'GREEN INITIATIVES'

Since there is no standard definition for 'green initiatives' it was important to understand the respondent's understanding of the concept. Question four listed eight options to choose from and also had the option to add any points not listed in the choice. The question stipulated that only one option should be chosen, however, nine respondents answered with multiple answers to the question. This was a shortcoming in the survey methodology since the respondents should not have been forced to choose only one option.

Since it was important to get an understanding of how respondents view 'green initiatives', questions with single responses were plotted together with all responses (Figure 5.4). The result clearly indicated that the overwhelming majority of the respondents defined the term 'green initiatives' as being synonymous with 'Reducing the carbon footprint'. During the OHA conference on Green Health Care, various presenters constantly stressed the importance of reducing GHG and the effect on global warming. The single responses reflected this. However, respondents that decided to choose multiple options clearly felt strongly that the term 'green initiatives' encompasses much more than just reducing the carbon footprint.

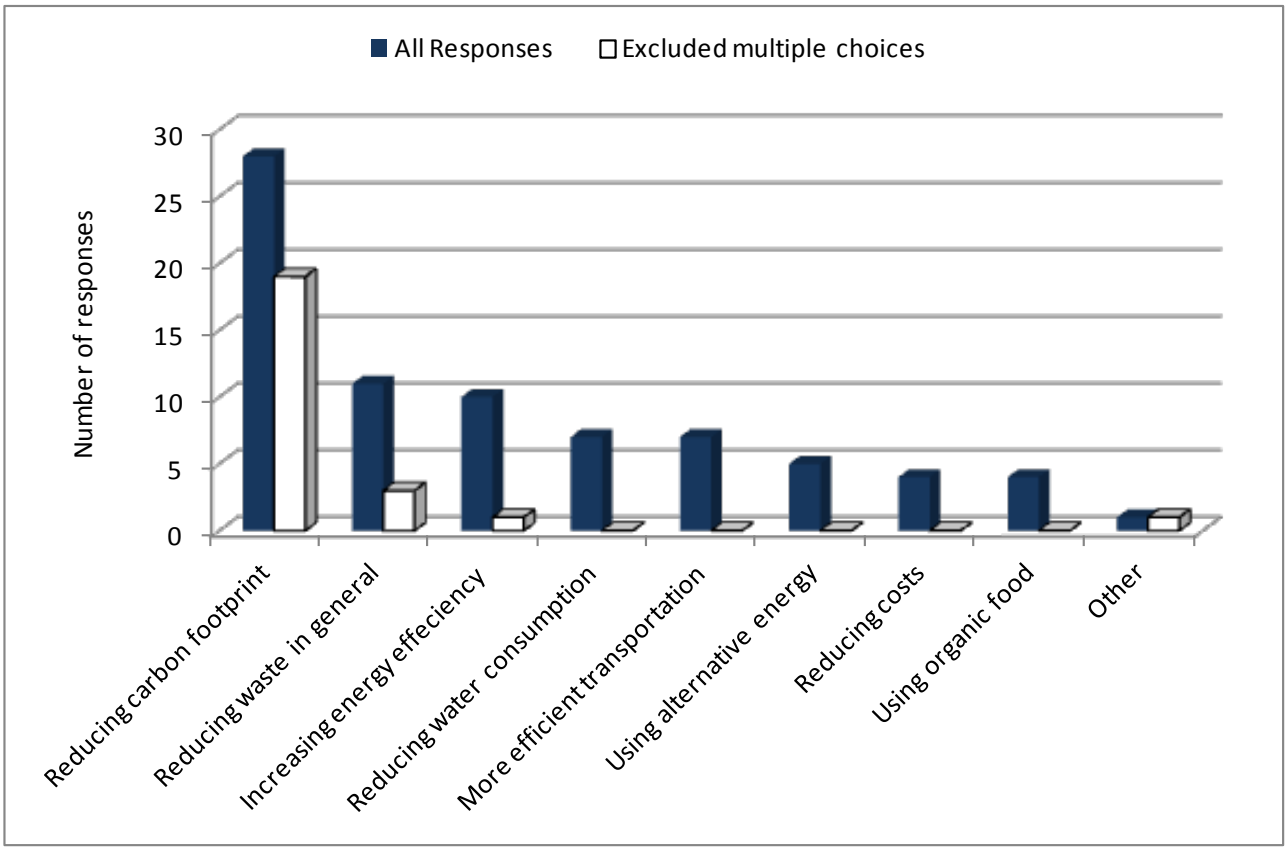


Figure 5.4: Understanding of the term 'green initiatives'

This result provided important additional information to sub-question 1.2.1 (iii). This question assessed what the primary motivation was for the implementation of green initiatives in Ontario hospitals. Since the overwhelming majority of respondents indicated that green initiatives are synonymous to the reduction of GHG, there was no confusion further in the survey relating to the definition and understanding of the concept 'green initiatives'.

5.4 LEVEL OF MATURITY OF GREEN PROJETCS

Questions five, six and thirteen measured the maturity of green projects that have been implemented. All respondents indicated that their hospitals have implemented green initiatives; however, no respondent believed that green initiatives were implemented throughout the business. The majority of hospitals have also done an environmental audit. The results from questions five and six are displayed in Figure 5.5.

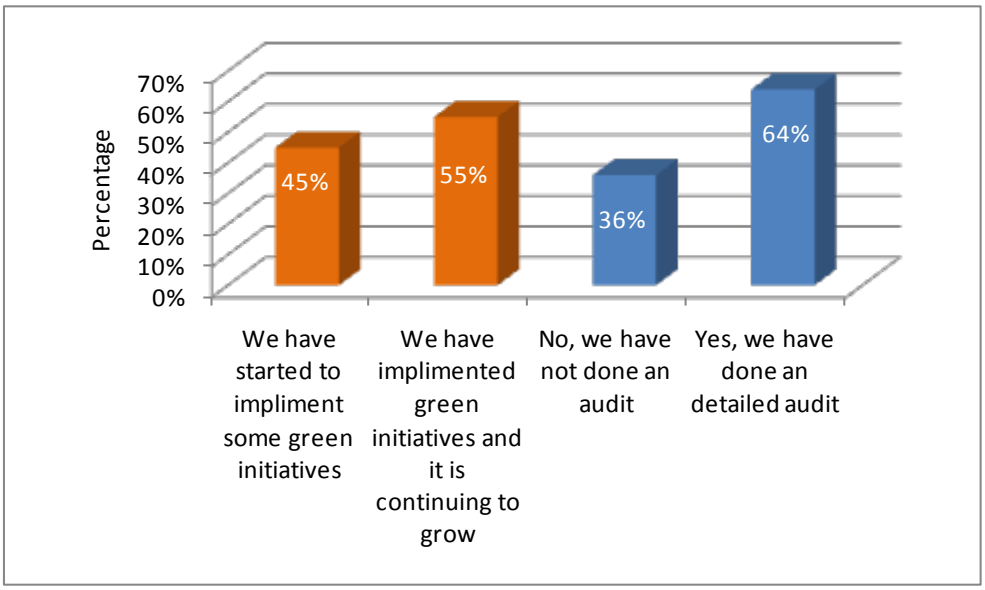


Figure 5.5: Measuring green projects' maturity

The results in Figure 5.5 addressed sub-question 1.2.1(i) directly. This question specifically probed the extent of green initiatives implemented in Ontario hospitals. From the data obtained from the OHA (refer to Section 4.2), it was determined that 104 green projects from 72 hospitals have been registered in Ontario, relating to an incidence of 32 percent. Figure 5.5 shows that nearly half of these green projects are new projects. The remainder of the projects are continuing to grow. Although all respondents have implemented green initiatives, 36 percent have not yet conducted an environmental audit. This is unexpected since the OHA has made available funds for hospitals to conduct electricity and waste audits.

The results for question thirteen in Table 5.3 also show that green projects are still in an immature stage. Projects are, either just in the implementation stage, or implemented but still expanding, which supports the findings in Figure 5.5.

Table 5.3: Status of green projects in hospitals in Ontario

Status of green projects	% of hospitals
In the planning stage	33
In a pilot programme stage	33
Fully in use in appropriate departments	24
Fully in use hospital wide	3
Implemented at random according to common sense	6

In terms of the overall research question, this indicates that Ontario hospitals are potentially struggling to justify the resources needed to implement green initiatives in full and to its maturity stage.

The relationship between the immaturity and/or inexperience of hospitals in green projects and the expected return on investments, is explored under Section 5.11.

5.5 GREEN PROJECT IMPLEMENTATION

The results from question seven indicates that (1) energy efficiency, (2) waste and (3) water are the top three areas in which hospitals have implemented green initiatives (Figure 5.6). As already observed under Section 5.2.3, certain projects will have a higher likelihood to be implemented than others based on the size of the hospital. The overall results in this question indicated that projects that are easy to implement and in general require less capital to implement are the most common.

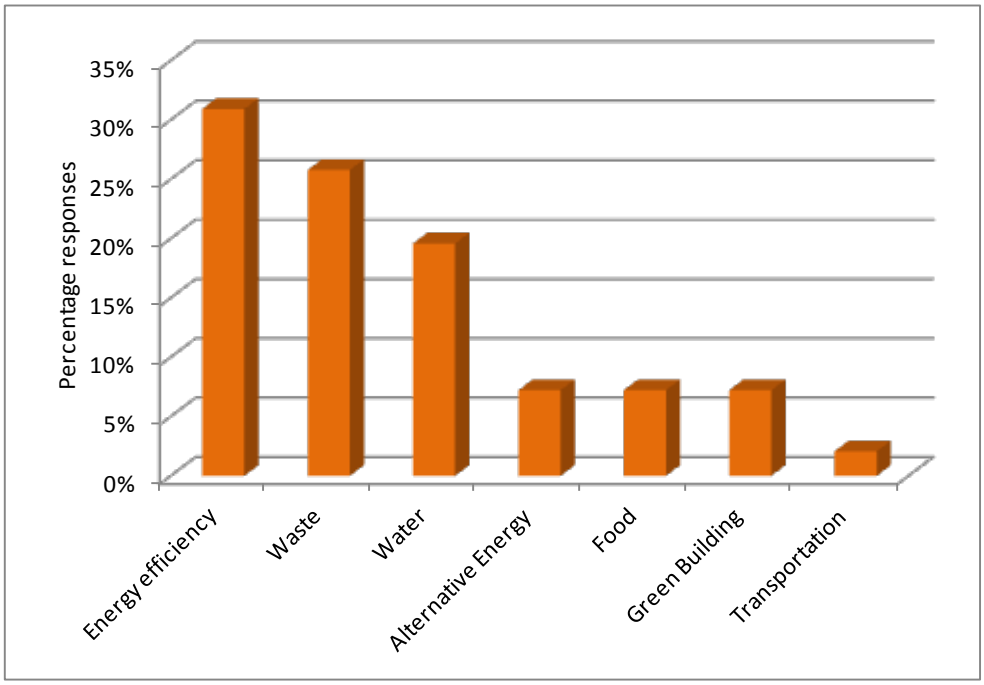


Figure 5.6: Areas where green initiatives have been implemented

Most initiatives in these areas can simply be achieved through a change in behaviour. This is consistent with the information in the literature discussed in Chapters 2 and 3. It also indicates that the two areas that have received the most attention by the regulators have received the most attention by the hospitals, namely energy efficiency and waste.

Water is the third most common area where green initiatives have been implemented. Saving water can be done relatively quickly and easily through changed behaviour. Capital investment projects in water can have a very quick payback as discussed under Section 2.2.6. This would explain why water has been the third most common area for the implementation of green initiatives.

All areas that are difficult to implement or that are capital intensive, have been treated as a low priority. Three out of the four initiatives with the lowest implementation frequencies were areas where savings would be difficult to obtain without an initial capital investment. These were alternative energy, green buildings and transportation. This, together with the fact that these type of projects in general have a longer payback period, would explain why projects in these areas are not popular.

Food has been an area that also has not received much attention. As seen under Section 2.2.7, the barriers to the implementation of food-related green initiatives can be difficult to overcome, which would explain this result.

These results should be interpreted in conjunction with the results under Section 5.2.3, which explained the implementation of various green initiatives also as a function of the size of the hospitals. This evidence did not support the theory that larger hospitals will tend to implement more extensive green initiative projects, but indicated that major cost-saving projects are equally important to all hospitals, regardless of their size.

When interpreting this result in view of the research question, this data clearly answers sub-question 1.2.1 (ii) which explores the areas where Ontario hospitals have been focusing their green initiatives. This is also consistent with the information from the literature review, which indicated that hospitals will favour initiatives that are easy and quick to implement, require little capital input and have a very short payback period. This is a strong indication that hospitals in Ontario can justify the capital and resource investment needed to implement green initiatives based on reducing operating costs while reducing GHG at the same time. This aspect clearly points at an eco-efficiency strategy (Orsato, 2006).

5.6 EFFECTS OF GREEN INITIATIVES

Respondents were asked in question eight whether they agreed or disagreed with five statements regarding the effects of green initiatives on the business. The results are displayed in Figure 5.7. These questions are evaluated individually below.

5.6.1 Green initiatives and an increase in costs

Respondents were asked whether they agree or disagree with the statement that the implementation of green initiatives will result in an increase in costs due to processes and materials that are more expensive. The results indicated that 27 percent of the respondents think that to implement green initiatives will increase costs, while the majority of respondents disagreed that it would increase costs. Clearly, the association with specific green projects will drive the difference in perspective. If the association is with energy-saving projects, it may result in the perspective of cost decrease. However, if the association is with LEED building projects, the association will definitely be an increase in costs.

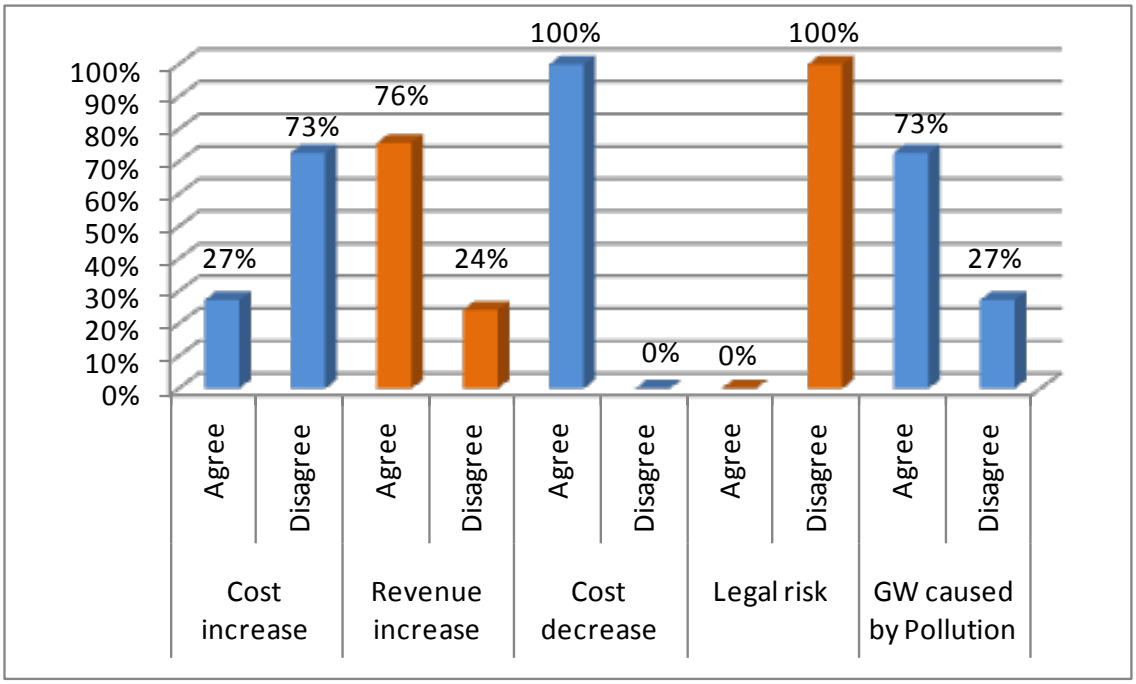


Figure 5.7: Responses regarding the impact on cost, revenue and risk

5.6.2 Green initiatives and an increase in revenue

Although hospitals in Ontario cannot increase its revenue through sales and marketing efforts, 76 percent of the respondents agreed that the implementation of green initiatives would result in an increase in revenue opportunities for hospitals. Further research would be required to understand what these opportunities would be. One explanation would be that the reduction of costs associated with green projects, would result in an increase of profits. Some respondents may see this as equal to an increase in revenue. Referring back to Section 2.2.3, hospitals that generally operate at a four percent or less operating margin, can see the equivalent in revenue of 25 times the amount saved in bottom line expenses.

However, there are also other opportunities. Referring to the case study of the Hospital for Sick Children (Section 3.2.3), hospitals in Ontario have the ability to raise funds from private donors. Therefore, the potential exists for the various fundraising foundations to use green initiatives as a

selling point when approaching donors. By arguing the point that high-quality health care is provided while the impact on the environment is reduced, resulting in an overall improvement of health of society, it may be possible to gain a competitive advantage over other hospitals in Ontario when a donor decides whom to support.

5.6.3 Green initiatives and a decrease in costs

All respondents believed that the implementation of green initiatives would result in a decrease in costs resulting from efficiencies gained. Question 8a asked respondents to agree or disagree with the following statement: “The implementation of green initiatives will result in an increase in costs due to more expensive processes and materials”. The wording “due to more expensive processes and materials” in the question potentially guided 27 percent of the respondents toward thinking of capital-intensive projects. This does not seem to be the case in question 8c, which stated: “The implementation of green initiatives will result in a decrease in costs resulting from efficiencies. The wording “a decrease in costs resulting from efficiencies” potentially guided respondents towards pure cost-saving green initiatives. This would explain the discrepancy observed between question 8a and 8c.

5.6.4 Global warming and pollution

Question 8e looked at how respondents perceived the causes of global warming. The literature study indicated that 39 percent of Canadians do not believe that global warming is caused through human intervention (refer to Section 2.1). This question did not ask the respondent what his own perception was, but rather whether he or she believed that the majority of people in the hospital believed that global warming was caused by pollution. The results showed that 27 percent of the respondents indicated that they disagreed with the statement. Although this figure is lower than the figure reported in the literature, it still indicates that there are a significant number of people who do not believe that pollution is caused by global warming. This is a potential barrier for the implementation of green initiatives.

5.6.5 Implications of the effects of green initiatives on the research question

The responses under Section 5.6 have a number of implications for the research question. In particular, it addressed the issue under sub-question 1.2.1 (iii), which investigated the primary motivation for the implementation of various green initiatives in Ontario hospitals. This data indicated that the primary motivation for the implementation is the reduction is operating costs. This re-emphasises the results that were seen under Section 5.5 as well as data obtained from the literature study.

5.7 STAKEHOLDER DEMAND FOR GREEN INITIATIVES

Question nine was an attempt to assess how strong any stakeholder demand is on hospitals to implement green initiatives, regardless of costs and benefits. Respondents rated each stakeholder on a five-point scale, indicating how strong the current demand is for the implementation of green initiatives. The results are shown in Figure 5.8.

The results indicated that there is no particular stakeholder with a very high demand for the implementation of green initiatives. Average scores for the stakeholders ranged from 2.4 to 3.5, indicating a low to medium demand. The highest rated demand was from suppliers. In this context, 'suppliers' refer mainly to electricity, water and waste removal companies. Some of these companies have made available incentives to hospitals to reduce consumption in order to reach their own environmental sustainability targets. The pressure on hospitals to reduce consumption is clearly seen as pressure from suppliers to implement green initiatives.

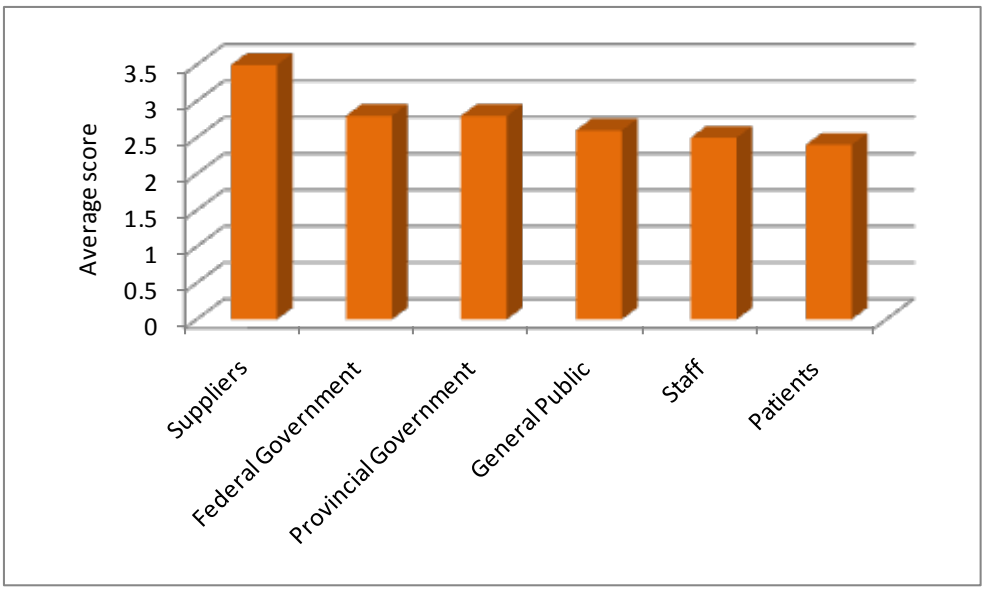


Figure 5.8: Stakeholder demand for green initiatives

However, consistent with the literature review that was done in Chapter 3, these results did not indicate any significant pressure on hospitals to implement green initiatives. These results directly addressed sub-question 1.2.1 (iv), which explored how strong external pressures are on the implementation of green initiatives. Clearly, there are very little external or internal pressures on hospitals to implement green initiatives. Seen in the context of the overall research question, Ontario hospitals would not be able to justify the capital and resource investment on green initiatives purely based on regulatory requirements or stakeholder demand.

5.8 WHY HOSPITALS IMPLEMENT GREEN INITIATIVES

This question assessed the general reasons as well as the main reason why hospitals are implementing green initiates in Ontario. The results are shown in Figure 5.9. The overwhelming single most important reason why hospitals in Ontario implement green initiatives, is to reduce operating costs. Looking at all reasons, hospitals do not implement green initiatives to gain a competitive advantage over other hospitals. Demands from staff and patients are low motivational factors, supporting the findings in Section 5.7.

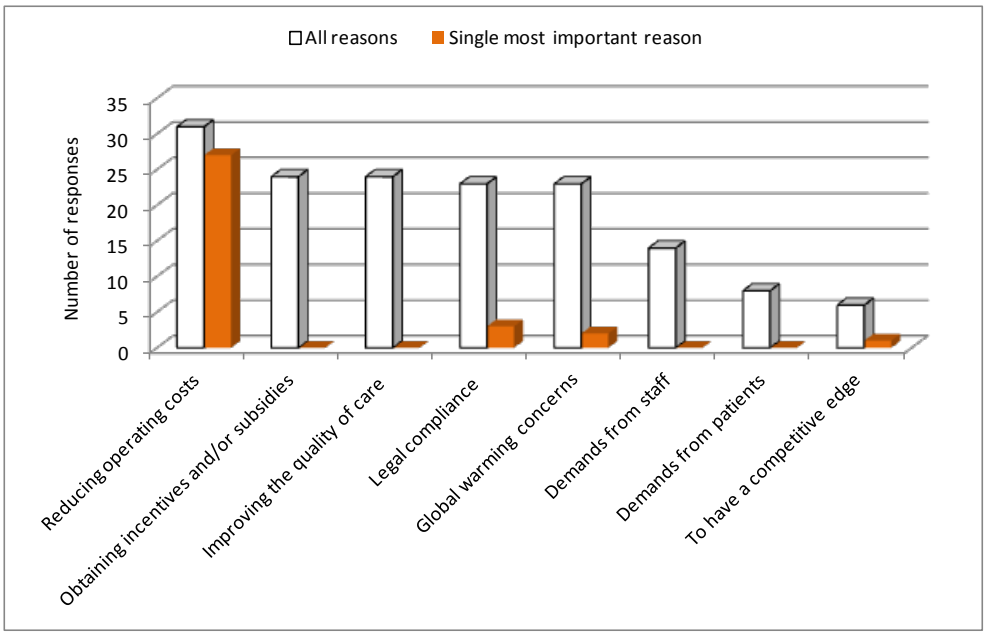


Figure 5.9: Why hospitals implement green initiatives

In general, the most common reasons for justifying green initiatives, apart from reducing costs, were to obtain subsidies and incentives, improve quality care, legal compliance and global warming concerns. However, all these are secondary to the main reason why hospitals implement green initiatives, which is cost reduction.

5.9 FUTURE INVESTMENTS

A total of 67 percent of the respondents expected that the hospital would increase its investment in green initiatives within the next year (Figure 5.10). This drops to 21 percent in year two and just nine percent in year three. This indicated that there is an expectation to invest money in the short term in green initiatives. If these results are considered in conjunction with the results in Figure 5.3, then the investment will be into projects that would have a quick payback and that directly result in cost reductions.

These results gave a very strong indication that the expectation is that green initiatives should have a quick payback. In a situation where Ontario hospitals are relying on allocated budgets from

the government, it is clear that hospitals cannot plan for large investments in green initiates years ahead.

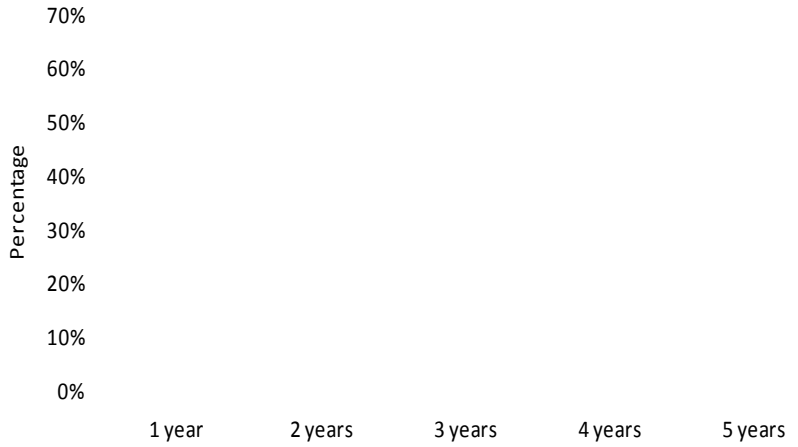


Figure 5.10: Anticipated time for increase in investments in green initiatives

In order to determine whether the expected investment into green initiatives are influenced by the size of the hospital, the correlation between the size of a hospital (question three) and the expected increase in investment into green initiatives (question 12) was determined. The result is displayed in Table 5.4.

Table 5.4: Correlation between hospital size and expected investment into green initiatives

	Spreadsheet 109 in results.stw				
	Variable 1	**Variable 2**	**Spearman**	**Spearman p-value**	**# cases**
1	Question 3	Question 4	-0.33	0.06	33

This result shows that the Spearman correlation is -0.33, indicating there is a weak negative correlation between the size of a hospital and the expected future investment into green initiatives. We can therefore infer that larger hospitals in Ontario will have a tendency to plan less for future investment into green initiatives than smaller hospitals. This is an indication that larger hospitals may have more flexibility on their budgets or that their operating costs are so high that there are few opportunities to make available capital for green initiatives. Further research in this regard would be needed.

Sub-question 1.2.1 (v) specifically explored the expected return on investment from Ontario hospitals. From the literature study in Chapter 2, it was clear that green initiatives could have very high return on investments. However, this is very project specific and the high-return projects usually required large up-front capital investments. When using this information to answer the overall research question, Ontario hospitals can justify the capital and resource investment in

green initiatives based on demonstrated returns on investment, but clearly see any investment into green initiatives as a short-term initiative.

5.10 IMPACT ON BUSINESS

Respondents were asked in question 14 what the impact was on various business areas after green initiatives were implemented. The detailed results are shown in Appendix B, Figures B.5 to B.9 and summarised in Table 5.5.

Table 5.5: Impact of green initiatives on business areas

Business area	**Impact**
Operational processes	Neutral / positive impact
Environmental performance	Neutral
Profitability	Positive impact
Reputation and public image	Neutral
Competitiveness with other hospitals	Neutral / no impact

The results from this question again support the overall findings so far, that green initiatives are centred around cost savings and operational processes, and not really around environmental sustainability. Reputation and competitiveness are not seen to be impacted by green initiatives at all, while the neutral result on the impact on the environment probably indicates that respondents are not sure what the results are.

If these results were interpreted in line with Orsato's (2006) model shown in Figure 1.1, then the only competitive environmental strategy that could be used in Ontario hospitals, would be eco-efficiency. With the low impact on reputation and competitiveness, it is a clear indication that these factors are not deemed to be important to Ontario hospitals. This means that other strategies like 'beyond compliance leadership' or 'eco-branding' would not be considered. These results are also a strong indicator that hospitals in Ontario would justify the implementation of green initiatives solely on the positive effect on operational processes and profitability.

5.11 IMPORTANCE OF GREEN INITIATIVES

Respondents were asked in question 15 to rate the reasons, in order of importance, why it is important to implement green initiatives at their hospitals. The detailed results are shown in Appendix B, Figures B.10 to B.14. The results are summarised in Table 5.6.

The importance to save costs was again indicated to be the most important factor, while gaining a competitive advantage was the least important. Also rated as not important, was the expectation of the public. In this rating, the moral and ethical issues are an important consideration.

Table 5.6: Importance of the implementation of green initiatives

Rated statement	% rated as most important	% rated as least important
To gain a competitive advantage	3%	52%
To improve patient care	3%	18%
To reduce costs	73%	0%
To be morality and ethically correct	27%	0%
To meet the expectation by the public	0%	27%

When Orsato's (2006) model is applied to these results, it again highlights the emphasis on cost reduction in Ontario hospitals, while other qualitative considerations are rated low. Certainly, there is no expectation to gain a competitive advantage from green initiatives, since 53 percent of the respondents believed that this is the least important reason for their hospitals to implement green initiatives. Referring to Chapter 3 that discussed the Ontario hospital funding model, this is to be expected. The way that Ontario hospitals are operating currently, the possibility for employing any of Orsato's competitive environmental strategies, apart from eco-efficiency, is unlikely.

However, seen from the perspective of the research question in Section 1.2.1, this question answers and confirms sub-question (iii), which asked what the primary motivation is for Ontario hospitals to implement green initiatives. Clearly, these results point to cost savings, but also indicate that the environmental concerns also play a role.

5.12 PERCEPTION OF REQUIRED CAPITAL INVESTMENT NEEDED

Respondents were asked what their perception was about the amount of capital that would be needed to effectively roll out green initiatives in their hospitals. Nearly half of the respondents (48 %) indicated that they did not know what the capital requirements would be relative to the return. The remaining responses indicated that 25 percent believed that the capital requirements were high when compared to the financial return, while 28 percent believed the capital requirements were low when compared to the potential returns. One respondent remarked under "other" that the capital requirements depend on the project and that it would usually need a very short payback period.

In order to investigate whether the maturity of the green initiative projects and/or the inexperience of the respondents had an influence on this result, a chi-square test of a contingency table was conducted and the results were summarised in a two-way summary table. This test was performed to determine whether there was enough evidence to infer that question thirteen and question sixteen are related and to infer whether differences existed among the two populations of nominal variables.

The following hypotheses were formulated:

H_0: The two variables are independent.

H_1: The two variables are dependent.

The results are shown in Table 5.7.

Table 5.7: Relationship between project maturity and responses to capital investment needed

	Chi-square (df = 4) = 8.31, p = 0.08073			
Question 13	**Question 16 is very high compared to the potential financial return**	**Question 16 is very low compared to the potential financial return**	**Question 16 is unknown to me**	**Row totals**
In the planning stage	4	3	4	11
Row percentage	36.36%	27.27%	36.6%	
In a pilot program stage	0	4	7	11
Row percentage	0%	36.36%	63.64%	
Fully in use in appropriate departments	3	2	2	7
Row percentage	42.86%	28.57%	28.57%	
Totals	7	9	13	29

Since the p-value for the Chi-square test was 0.08, we fail to reject the null hypothesis and conclude that there is no relationship between the maturity of the project and the expected capital required for the project. However, should we conduct this test at a 90 percent confidence level, the results would be significant.

However, a number of observations can be made from the data in Table 5.7. One observation is that 64 percent of the respondents who indicated that their green initiative projects are in a pilot stage, did not know what the capital investment would be to effectively roll out green initiatives. Another observation is that 43 percent of the respondents who have fully implemented green initiative projects, indicated that the capital investment needed is very high compared to the potential financial return. This observation indicates that capital investment into green projects may be very difficult to justify, especially if short-term returns are expected. Referring to the barriers to the implementation of energy-saving green initiatives under Section 2.2.1.2, there is certainly an argument in Ontario hospitals that the capital investment into green initiatives cannot be justified only based on the assumption that their projects will have a high return on investment.

These results directly addressed sub-question 1.2.1 (v), which probed into the perceived return on investment of green initiatives. There are indications that most Ontario hospitals are not sure how much capital investment would be needed to effectively implement green initiatives, and therefore

would not be able to accurately assess the return on investment. This indicates that in general, green projects are probably not properly planned, implemented and project managed, and more likely implemented at a ‘quick fix’ to gain cost savings in order to balance the budget.

5.13 CONCLUSION

The results in this chapter provided sufficient information to answer the six sub-questions that are supporting the overall research question formulated under Section 1.2.1. The data obtained from this study also allowed the opportunity to obtain inferential statistics that were important to the overall research question in this study.

The results clearly demonstrated that the main driver for hospitals in Ontario to implement green initiatives is cost savings. Hospitals will also favour initiatives that are easy and quick to implement, require little capital input and have a very short payback period, which is consistent with the information in the literature review. The size of a hospital also plays a role in the number of initiatives as well as the type of projects implemented. The results further showed that there is no expectation to gain a competitive advantage from green initiatives. It also showed that there is no evidence that green initiatives are implemented due to stakeholder demands. This means that, should a hospital implement a competitive environmental strategy according to Orsato (2006), then an eco-efficiency strategy would be the most logical. There are two main reasons for this. Firstly, the non-competitive environment that Ontario hospitals are operating in, would not allow for any of the other strategies to be implemented. Secondly, due to the financial constraints that Ontario hospitals are operating under, the biggest need is to manage the operating expenses and cost savings will be a high priority. Therefore, green initiative projects are most probably implemented primarily for the cost-savings effects and the resulting reduction in GHG is seen as an incidental secondary result.

When considering the overall research question formulated under Section 1.2.1, these results indicated that the availability of capital is a definite factor in the consideration and justification of green projects. There were indications that hospitals will only invest in green projects if the payback periods are short. Hospitals are also not planning to increase their spending in green initiatives in the long term. Larger hospitals may have access to more capital for green initiatives and are therefore implementing more green initiatives. Therefore, although it seems obvious that hospitals in Ontario can justify the capital and resource investment needed to implement green initiatives on the basis of cost savings alone, the implications of this and alternatives are discussed in Chapter 6.

CHAPTER 6
SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

The WHO and HCWH discussion document released in 2009 was aimed at developing programmes that will assist the healthcare industry to reduce their own contribution to GHG emissions and therefore reducing their carbon footprint. The document (WHO & HCWH, 2009) identified three co-benefits for the healthcare industry if they could reduce their carbon footprint. The first is that the reduction of air pollution and water contamination would result in a more healthy society. The second is that there will be economical benefits, for example, savings obtained on energy bills. Thirdly, there will be social benefits, meaning that healthcare providers can become the advocates and an example to society. These co-benefits highlight an important issue that was not directly investigated in this research study, namely, that if hospitals reduce their carbon footprint, they will create a benefit that will benefit all of humanity. This benefit cannot be captured financially. This can be seen as the 'mission' of Ontario hospitals that are operating in a non-profit environment. However, in a world where income statements and balance sheets rule, creating these benefits without a direct financial gain is still a concept that very few organisations can support.

This research study's main aim was to determine to what extent Ontario hospitals are attempting to reduce GHG emissions through green initiatives. Most importantly, on what basis are the capital and resource investments needed for the implementation of green initiatives justified? The literature study and the survey results were viewed within a theoretical framework that was developed by Orsato (2006) that looked at potential competitive environmental strategies that Ontario hospitals could potentially employ.

The remainder of this chapter aims to summarise the main findings of this research study and to answer the main research question as well as all the sub-questions that were formulated. A conclusion is drawn from the results. Next, recommendations on how to improve the current situation are discussed. In conclusion, shortcomings of this study and recommendations for further research are noted.

6.2 SUMMARY OF MAIN FINDINGS

There are 255 hospitals in Ontario, Canada, that form the hospital network for the government healthcare network. These hospitals all operate in a non-competitive environment and funding is obtained primarily from the Ontario Ministry of Health and Long-Term Care. There is severe pressure on healthcare funding in the province and hospitals are finding it difficult to stay within budgets allocated to them by the ministry. In addition, these hospitals are operating at, or near full capacity.

The survey results are summarised below under the headings of the six sub-questions that were formulated under Section 1.2.1 to support the overall research question and repeated here for easier reference:

i) What is the extent of current green initiatives implemented in hospitals in Ontario?
ii) What business areas in hospitals are currently focusing on green initiatives?
iii) What is the primary motivation for implementing various green initiatives in hospitals?
iv) How strong are the external pressures to implement green initiatives?
v) What is the perceived return on investment of green initiatives?
vi) Is there a possibility to increase funding (revenue) to hospitals based on the implementation of green initiatives?

6.2.1 Extent of green initiatives' implementation

Around a third of hospitals in Ontario have implemented some form of green initiative. This study found that there is a moderate positive correlation between the size of a hospital and the number of green initiatives implemented, with larger hospitals being more likely to implement water and transportation projects. This means that there is evidence that larger hospitals have more flexibility, but also more urgency to implement green initiatives. There were strong indications that the main motivation for the implementation of green initiatives is cost-saving, rather than environmental concerns.

Most projects were still in the implementation stage or in the pilot project stage. Only three percent of hospitals reported that they had implemented green initiatives hospital-wide. This highlights the problem of free riders, since some hospitals are benefitting from the green initiatives that are implemented by other hospitals. As an example, proper waste management by one hospital can also result in the reduction in pollution-related illnesses, which will benefit another hospital as well.

The immaturity of green initiative projects, together with the finding that most respondents did not know what the return on investment for projects were, indicated that projects were most probably implemented as quick fixes and not as properly project-managed initiatives.

In support of the overall research question, the results in this section answered sub-question (i). It can be concluded that the extent of current green initiatives implemented in hospitals in Ontario is not widespread and that most projects are in an implementation or pilot project stage.

6.2.2 Areas green initiatives are focusing on

Hospitals in Ontario were focusing firstly on energy efficiency, secondly on waste management and thirdly on water savings. Other areas received less attention, with transportation the area with the least focus. Energy savings, alternative energy and waste projects were implemented equally across all sizes of hospitals, while larger hospitals tended to also implement water and transportation projects.

Energy savings, alternative energy and waste projects had the biggest impact on operating costs and will have a substantial impact on any hospital, regardless of its size. Food and building projects also showed no differentiation between the sizes of the hospitals. These findings are consistent with the information from the literature review, which indicated that hospitals would favour initiatives that are easy and quick to implement, that will have a substantial impact on operating costs, require little capital input and have a very short payback period.

In support of the overall research question, the results in this section answered sub-question (ii). It can be concluded that hospitals focused on energy efficiency, waste and water projects, with a clear preference to implement projects with quick returns, which require low capital inputs and are easy to implement.

6.2.3 Primary motivation for implementation of green initiatives

The results indicated that the overwhelming primary motivation for the implementation of green initiatives in hospitals in Ontario, was to reduce operating costs. However, there was a concern among some of the respondents that the implementation of green initiatives would increase operating costs. Clearly, the association with specific green initiative projects drove the difference in perspective. The reduction of GHG emissions was seen as a secondary effect by far. On a rating scale, cost reduction was the most important factor for implementing green initiatives, followed by ‘to be morally and ethically correct’, while ‘to gain a competitive advantage’, was rated as the least important reason.

In support of the overall research question, the results in this section answered sub-question (iii). It can be concluded that the primary motivation for implementing green initiatives was to reduce operating costs.

6.2.4 External pressures to implement green initiatives

Results in this study have shown that although there are a number of regulations that govern the control of waste and GHG emissions, legal compliance is not a primary motivation for the implementation of green initiatives. In addition, suppliers were the only group of stakeholders that was singled out as demanding hospitals to implement green initiatives. These suppliers are linked to energy and waste suppliers who are under pressure to reach their own environmental-sustainability targets. The government, general public, staff and patients are not seen as exerting pressure on hospitals to implement green initiatives.

In support of the overall research question, the results in this section answered sub-question (iv). It can be concluded that there are no or very little external pressures that are forcing Ontario hospitals to implement green initiatives.

6.2.5 Perceived return on investment

While some of respondents believed that the implementation of green initiatives would increase costs due to more expensive processes and materials, everyone agreed that green initiatives would lead to a decrease in operating costs. As expected, and in line with the findings in the literature review, projects with a low capital investment with a short payback period are the most common. A negative correlation between hospital size and the expected investment into green initiatives indicated that larger hospitals probably plan less for an increased spending into green initiatives over the next five years. There was no statistical relationship between the maturity of a green initiative and the perceived return on investment.

The non-commitment of hospitals to invest into green initiatives in the long term, serves as an indication that there is uncertainty regarding the returns of these projects. Another, even bigger concern is that larger hospitals will see any savings obtained from green initiatives disappearing very quickly through subsidising of inefficiencies in other operational areas. This ‘balancing the budget’ way of using savings in one area to benefit another area, can result in project leaders becoming de-motivated. It also prevents savings of being reinvested into new green projects.

Although nearly half of the respondents did not know how much capital would be needed to effectively implement green initiatives, this can most likely be linked to the level of maturity of green projects in Ontario hospitals. One observation was that the majority of respondents whose projects were in a pilot stage, did not know what the capital investment would be to effectively roll out green initiatives. Another observation was that some respondents, who have fully implemented green initiative projects, indicated that the capital investment needed is very high compared to the potential financial return. This observation indicates that capital investment into green projects may be very difficult to justify, especially if short-term returns are expected.

Although the literature review strongly indicated that green initiative projects have the potential to deliver high returns on investment, results from this study showed that there is a level of uncertainty regarding what the return on investments are in Ontario hospitals. The perceived return on investment therefore is not as high as suggested in the literature review.

In support of the overall research question, the results in this section answered sub-question (v). It can be concluded that the perceived return on investment in green initiatives is uncertain.

6.2.6 The possibility to increase revenue

These research results clearly indicated that Ontario hospitals are operating as non-profit companies in a non-competitive environment. Results showed that Ontario hospitals do not see any possibility of increasing revenue by becoming competitive. Green initiatives are exclusively seen as a cost reduction vehicle with the added benefit of reducing the GHG emissions.

Because Ontario hospitals are not-for-profit companies, they are already using non-profit strategies for their overall strategic planning. Green initiatives could be positioned as a driver of effectiveness and could focus towards reaching the 'mission accomplished' stage, rather than 'outperform rivals' as seen in for-profit companies. The results in this research study confirmed this position; however, there seems to be a lack of understanding on how to effectively utilise green initiative projects to gain the required results.

In support of the overall research question, the results in this section answered sub-question (vi). It can be concluded that Ontario hospitals see no opportunity to increase revenue based on the implementation of green initiatives in their current environment; however, they see the reduction in operating expenses on the same level as an increase in revenue.

6.3 THE OVERALL RESEARCH QUESTION

The overall research question asked on what basis hospitals in Ontario can justify the capital and resource investment needed to implement green initiatives. Based on the information available from the literature review and the research results, it can be concluded that at the time that this research was done, hospitals in Ontario could justify capital and resource investments into green initiatives based only on cost savings as a result of a reduction in operating costs.

6.4 CONCLUSION

The results from this research study clearly indicated that Ontario hospitals used green initiative projects mainly as a cost reduction initiative. There is no evidence to suggest that any of these initiatives were driven by environmental concerns. The most logical explanation for this is the extreme financial pressures on Ontario hospitals to balance their budgets. This is a secondary effect of the financial pressure that is exerted on the Ontario Ministry of Health and Long-term Care by the local and federal governments. The existing funding model, together with the non-profit and non-competitive environment, will continue to be a major barrier to widespread implementation of green initiatives in Ontario hospitals. As long as this situation prevails, green initiatives will be seen as cost reduction projects, rather than projects that drive environmental sustainability. Thanks to the efforts from organisations like the OHA and CCGHC, hospitals are constantly educated, motivated and assisted to continue to expand their green initiatives.

The immaturity of existing green projects and the lack of understanding of the required capital and potential returns, raise concerns in terms of how well green initiative projects are planned and implemented. It is more likely that the majority of hospitals implement green initiatives as a desperate attempt to reduce operating costs, without proper planning or project management. This is a strong indication that there is a lack of understanding of what green initiatives really are and how these types of projects should be planned and managed. This suggests that there is potentially a need to train staff, who would be responsible for implementing and managing these projects.

Both points listed above feed into the issue of strategic planning which has two components in this context, namely competitive and non-competitive strategies. In this unique situation, the competitive strategy can support the non-competitive strategy. The non-competitive strategy in this context will drive towards collaboration with other stakeholders. Since this is a non-profit environment, the overall aim should be to fulfil a specific mission, like reducing the carbon footprint, rather than driving towards strong profitability. This strategy was devised specifically for companies that need to reduce their operating costs as well as their environmental footprint, which is a perfect fit for Ontario hospitals. Therefore, hospitals will have to become more educated regarding the implementation of these projects. By learning to implement these projects effectively, hospitals can increase their resource productivity by better utilisation of waste.

6.5 RECOMMENDATIONS

6.5.1 Obtain special privileges

The highly regulated environment surrounding Ontario hospitals dictates the way that hospitals can approach green initiatives. The main issues revolve around the availability of capital to fund green initiative projects as well as the dilution of any savings obtained from such initiatives. The recommendation from this study is that the OHA or a hospital delegation should actively start to campaign that green initiative gains should be deregulated and that it should receive special privileges. Referring to Section 3.3.4, isolating savings from green initiatives would be very important to sustain these initiatives. Hospitals should be given the opportunity to implement green initiatives, and the savings obtained from this could be retained in a special green fund for expansion of green initiatives. This would be an effective way to ensure that savings are reinvested into green initiatives, rather than used to subsidise other functional areas that are not well managed.

6.5.2 Implement collaboration strategies

At the time of this research project, just 32 percent of the hospitals in Ontario had implemented some form of green initiative. The type of projects differed from hospital to hospital and based on observations at the OHA Conference on Green Health Care that was held in Toronto in June 2011 each hospital is working independently on green initiative projects. By implementing collaborative strategies, two objectives can be obtained. Firstly, hospitals that have not done anything to address GHG emissions to date, can be involved in future group projects. This would address the problem of free riders and will also assist newcomers with expertise from hospitals that have implemented green initiatives before. Secondly, hospitals can collaboratively approach vendors and negotiate special terms for green initiatives. Apart from the benefits of bulk buying, this creates opportunities for suppliers such as organic food growers, offering them a sustainable proposition.

6.5.3 Centralise management of projects

The differences in the type of projects and the various levels of success obtained in implementing them, support the fact that implementing green initiative projects is not a core competency in Ontario hospitals. One possible solution would be a centralised committee who are subject matter experts in green initiative projects and project management. This committee would be responsible for identifying and selecting appropriate projects, calculate the return on investment as well as the capital required, and then project manage the project. Hospitals can collectively pool resources on large projects. These projects can be implemented at multiple hospitals at the same time and the overall as well as individual benefits would be determined by the committee. Ideally, this would work optimally if savings obtained can receive special privileges as discussed under Section 6.5.1.

6.5.4 Invest in training

Regardless of whether any of the recommendations above are followed, one sure way of improving the current situation, is through training. In general, it is common practice in companies worldwide to ask staff to take on additional work like a green initiative project, without having any background about it. The results in this study also indicated that projects that have been implemented, may not have been planned and managed properly. The annual conference that is organised by the OHA, is not sufficient to educate and train staff on the selection and management of these projects. Hospitals would greatly benefit if they collaborate to organise training to staff that are typically pre-selected to participate in the implementation of green initiative projects.

6.6 SHORTCOMINGS OF THIS STUDY AND RECOMMENDATIONS FOR FURTHER RESEARCH

The major shortcoming of this study was the sampling process that did not allow the researcher to survey all hospitals in Ontario, including those that did not implement green initiatives. The selected population of 72 hospitals was based on information provided by the OHA and could not be verified with independent research. The 33 hospitals surveyed at the OHA conference could not be considered as a random sample since they had a specific interest in attending the conference.

Another shortcoming of this study was that the questionnaire did not allow the researcher to explore answers beyond the first question. As an example, the understanding of how hospitals interpret ‘revenue’ needs to be explored further. It would be beneficial to understand why 76 percent of respondents believed that green initiatives would lead to an increase in revenue, when there is no opportunity in this market to increase revenue in a non-competitive environment.

Further research into non-competitive strategies and more specifically looking at collaborative initiatives between hospitals would be very valuable. As already indicated under Section 6.5, collaborative strategies may be the key to hospitals in Ontario to effectively implement green initiatives. This is not something that has been done before in this environment and an

understanding of the potential and opportunities will assist Ontario hospitals to formulate a way forward.

In addition, it would be valuable to understand how different for-profit hospitals in a competitive environment deal with the implementation of green initiatives and what value they extract from of it. This research study should be repeated in a for-profit competitive environment and the results should be compared to this study. The identification of the dominant competitive environmental strategy in the for-profit competitive environment would shed light on how different the for-profit competitive and the non-profit non-competitive environments really are. This would be useful information for researchers to formulate strategies for companies that operate in a non-competitive environment.

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APPENDIX A:

QUESTIONNAIRE

USB
University of Stellenbosch
Business School

Dear Respondent

Questionnaire regarding the Strategic Intent behind the implementation of Green Initiatives in Hospitals in Canada

As part of a Masters degree in Business Administration at the University of Stellenbosch Business School, Julius Ueckermann is currently conducting a research project aimed at understanding the strategic intent for the implementation of green initiatives in hospitals in Canada. Mr. Ueckermann is currently employed by Ornge as Vice President – Logistics and is resident in Toronto, Canada. We have communicated with the Ontario Hospital Association (OHA) and the Canadian Coalition for Green Health Care in this regard. The Canadian Coalition for Green Health Care has been helpful in providing contacts to which this questionnaire will be sent.

Your truthful and thorough responses are important in obtaining a better understanding of the challenges associated with the implementation of green initiatives in hospitals. The data obtained will be analyzed and the findings will be available made through the Canadian Coalition for Green Health Care. The information you provide will be treated in the strictest of confidence and will only be used for this specific research study. **IMPORTANT: If you are not directly attached to a hospital in Canada, please do not complete this questionnaire.**

The questionnaire does not collect any form of identification from the respondent and does not disclose your identity in any form. The completion of this questionnaire should take less than 10 minutes of your time, there are just 16 questions. It will be appreciated if you can complete the questionnaire at your earliest convenience. Please find the link to the electronic survey below. If the link doesn't work, please copy and paste it in your browser:

https://www.surveymonkey.com/s/hospitalinitiatives

Please contact us if you have any questions and thank you in advance for your time.

Kind Regards,

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Questionnaire

Green Initiatives survey for Hospitals in Ontario **June 2011**

1. Please indicate the closest description to your title:
   a. Manager ( )
   b. CEO/MD/President ( )
   c. VP/Director ( )
   d. Head of Business Unit ( )
   e. CIO ( )
   f. Head of Department ( )
   g. Board Member ( )
   h. CFO/Financial Controller ( )

   i. Other _____

2. What are your main responsibilities?
   a. IT ( )
   b. General Management ( )
   c. S & M ( )
   d. Finance ( )
   e. Legal ( )
   f. HR ( )
   g. Supply chain management ( )
   h. Customer Services ( )

   i. Other _____

3. Please indicate the approximate number of beds in your hospital:

   a. Number of beds _____

4. Please indicate which of the following statements define your understanding of the term "Green Initiatives". Please choose only **ONE**:
   a. Reducing the carbon footprint ( )
   b. Reducing waste in general ( )
   c. Reducing costs ( )
   d. Increasing energy efficiency or using alternative energy ( )
   e. Using alternative energy ( )
   f. Reducing water consumption ( )
   g. Using organic food ( )
   h. More efficient transportation ( )

   i. Other _____

5. To what extent has your hospital implemented green initiatives?
   a. We have not implemented any green initiatives ( )
   b. We have started to implement some green initiatives ( )
   c. We have implemented green initiatives and it is continuing to grow ( )
   d. We have implemented green initiatives throughout most of the hospital ( )
   e. We have fully implemented green initiatives in all areas of the hospital ( )

6. Has your hospital done an environmental audit to determine the opportunities for the implementation of green initiatives?
   a. No, we have not done an audit ( )
   b. No, we have not done an audit, but we know where the opportunities are ( )
   c. I don't know ( )
   d. Yes, we have done a detailed audit ( )
   e. Yes, we have done a highly detailed audit ( )

7. Please indicate the **areas in which you have implemented** green initiatives.
   a. Energy efficiency ( )
   b. Alternative energy ( )
   c. Waste ( )
   d. Water ( )
   e. Food ( )
   f. Transportation ( )
   g. Environmental Friendly constructed building ( )

   h. Other _____

8. Please indicate whether you agree or disagree with the following statements:

   a. The implementation of green initiatives will result in an increase in costs due to more expensive processes and materials (Agree) (Disagree)
   b. The implementation of green initiatives will result in an increase in revenue opportunities for the hospital (Agree) (Disagree)
   c. The implementation of green initiatives will result in a decrease in costs resulting from efficiencies (Agree) (Disagree)
   d. The implementation of green initiatives is risky as it can lead to an increase in lawsuits (Agree) (Disagree)
   e. The majority of staff in my hospital believes that global warming is caused by pollution (Agree) (Disagree)

9. Please indicate how strong is the current demand for the implementation of green initiatives in your hospital among the following stakeholders (Please rate each stakeholder on a scale from 1 to 5, 1=very high demand, 5=no demand). **Please circle your rating for each stakeholder.**

a. Federal Government (1 2 3 4 5)
b. Local Government (1 2 3 4 5)
c. Staff (1 2 3 4 5)
d. Patients (1 2 3 4 5)
e. General Public (1 2 3 4 5)
f. Suppliers (1 2 3 4 5)

g. Other _____

10. What do you think are the reasons why your hospital is implementing green initiatives? Please indicate the reasons that are applicable from the list below.

a. Reducing operating costs ( )
b. Legal compliance to environmental regulation ( )
c. Obtaining incentives and/or subsidies ( )
d. To have a competitive edge over other hospitals ( )
e. Demands from staff/staff retention ( )
f. Meeting demands from patients ( )
g. Improving the quality of care of patients ( )
h. Global environmental concerns ( )

i. Other _____

11. Of the factors listed below, which is the **single most important reason** for implementing green initiatives in your hospital? **Please select only one.**

a. Reducing operating costs ( )
b. Legal compliance to environmental regulation ( )
c. Obtaining incentives and/or subsidies ( )
d. To have a competitive edge over other hospitals ( )
e. Demands from staff/staff retention ( )
f. Meeting demands from patients ( )
g. Improving the quality of care of patients ( )
h. Global environmental concerns ( )

12. I am anticipating that my hospital will increase its investment in green initiatives within the next ___ years?

a. 1 ( )
b. 2 ( )
c. 3 ( )
d. 4 ( )
e. 5 ( )

f. Other _____

13. The current status of green projects in my hospital is

a. none, there are no green projects currently ( )
b. in the Planning stage ( )
c. in a pilot program stage ( )
d. fully in use in appropriate departments ( )
e. fully in use Hospital-wide ( )
f. implemented at random according to common sense ( )

14. Since your hospital introduced green initiatives, what do you think was the impact on the following the following areas? (Please rate each from 1 to 5, 1 = very positive, 5 = no impact at all)

a. Operational Processes (1 2 3 4 5)
b. Environmental Performance (1 2 3 4 5)
c. Profitability (1 2 3 4 5)
d. Reputation and public image (1 2 3 4 5)
e. Competiveness with other hospitals (1 2 3 4 5)
f. Don't know/not applicable (1 2 3 4 5)

g. Other _____

15. Please rate the following statements in **order of priority**. 1 = most important, 5 = least important.

Implementation of green initiatives in my hospital is important because...

a. It has the potential to gain a competitive advantage over other hospitals ( )
b. It has the potential to improve patient care ( )
c. It has the potential to reduce costs ( )
d. It is morally and ethically the right thing to do ( )
e. It is an expectation by the general public ( )

f. Other reasons _____

16. The capital investment needed to effectively roll out green initiatives in my hospital

a. is very high compared to the potential financial return ( )
b. is very low compared to the potential financial return ( )
c. cannot be calculated since the outcome is non-financial ( )
d. is unacceptably high regardless of the outcome ( )
e. is low overall and is not a concern ( )
f. is unknown to me ( )

g. Other _____

APPENDIX B:
SUPPLEMENTARY SURVEY RESULTS

Figure B.1: Job profiles of respondents

Figure B.2: Areas of responsibility of respondents

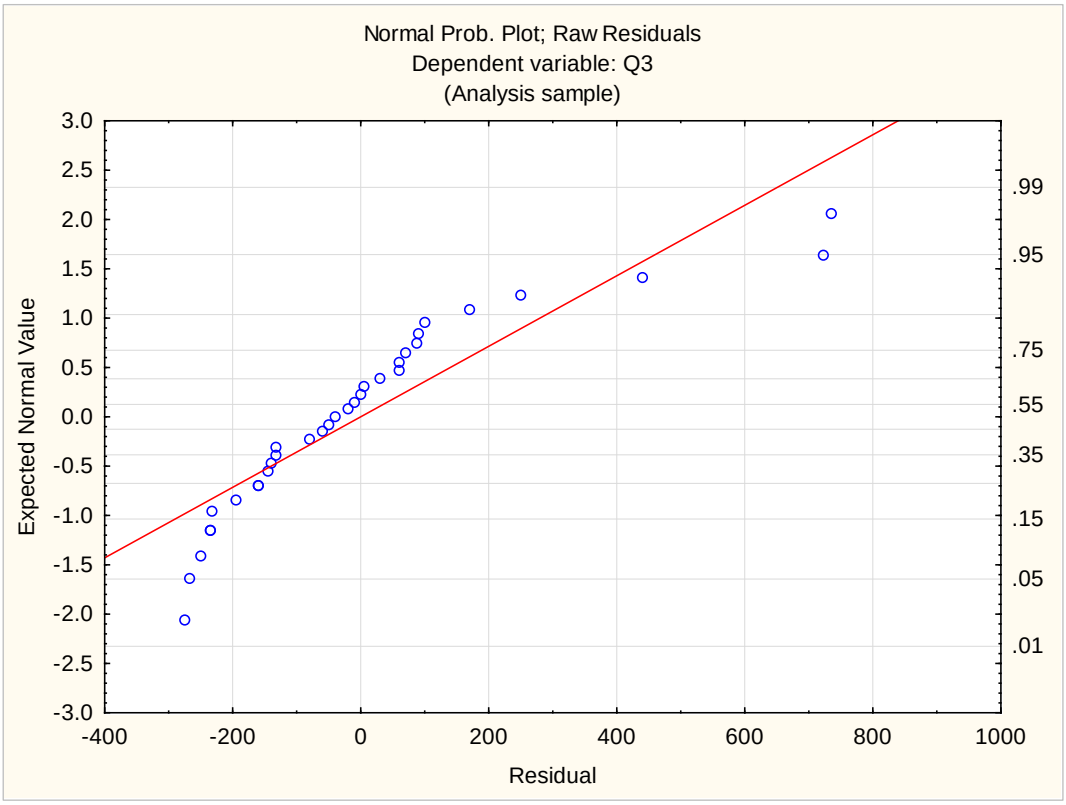

Figure B.3: Normal probability plot with raw residuals for 'water' in Figure 5.2.

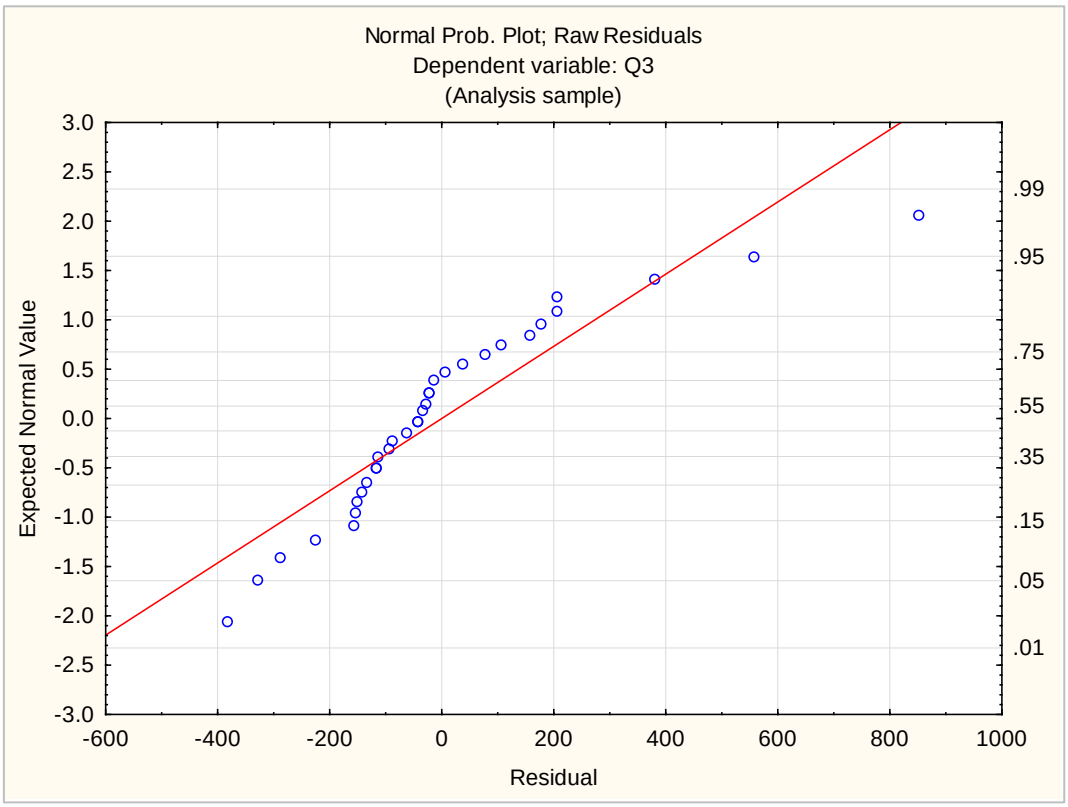

Figure B.4: Normal probability plot with raw residuals for 'transportation' in Figure 5.3

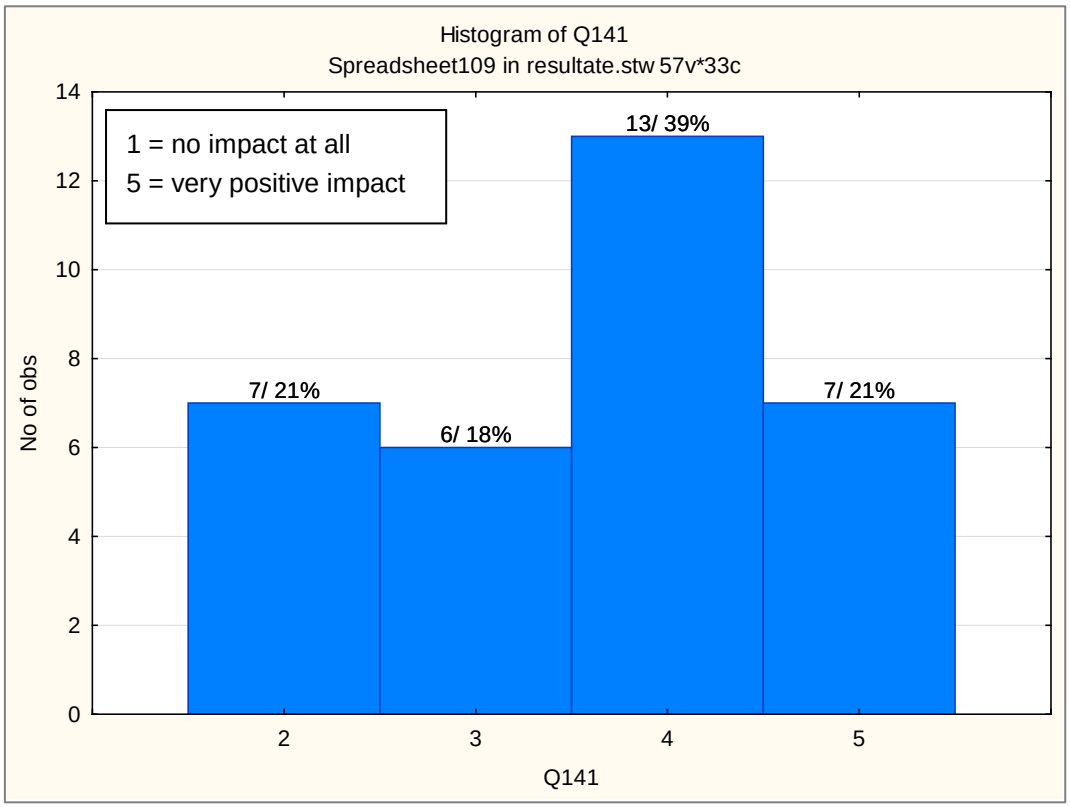

Figure B.5: Rating of the impact of green initiatives on operational processes

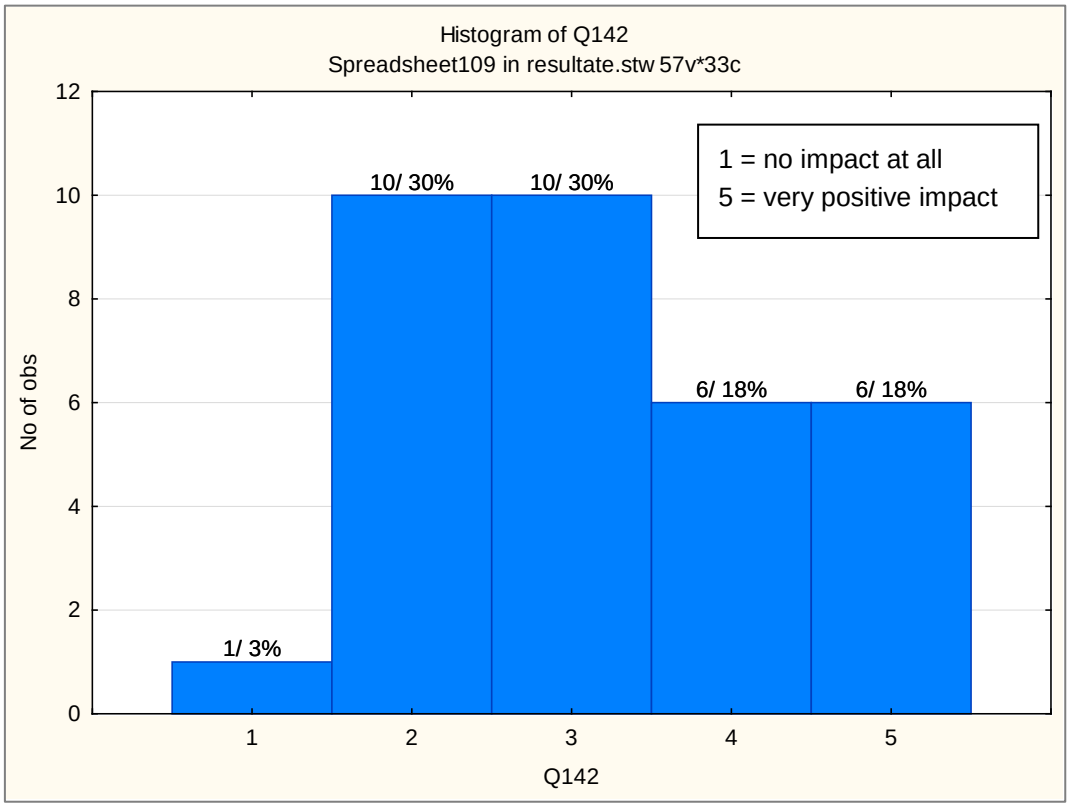

Figure B.6: Rating of the impact of green initiatives on environmental performance

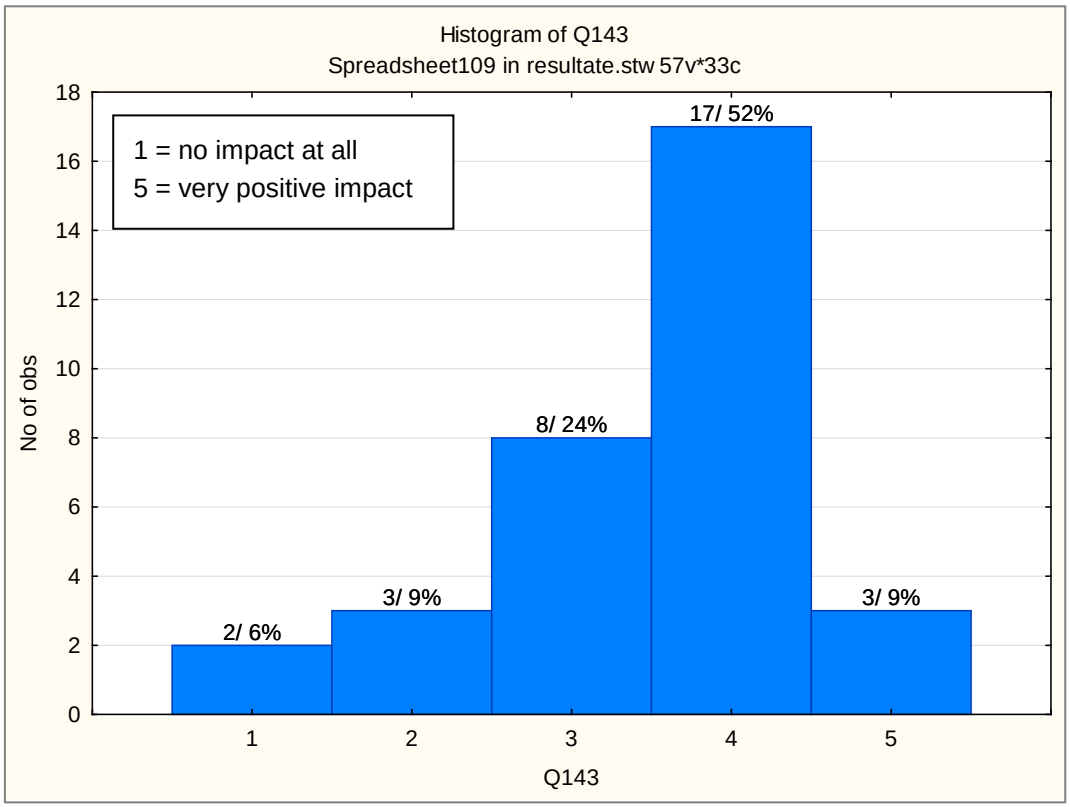

Figure B.7: Rating of the impact of green initiatives on profitability

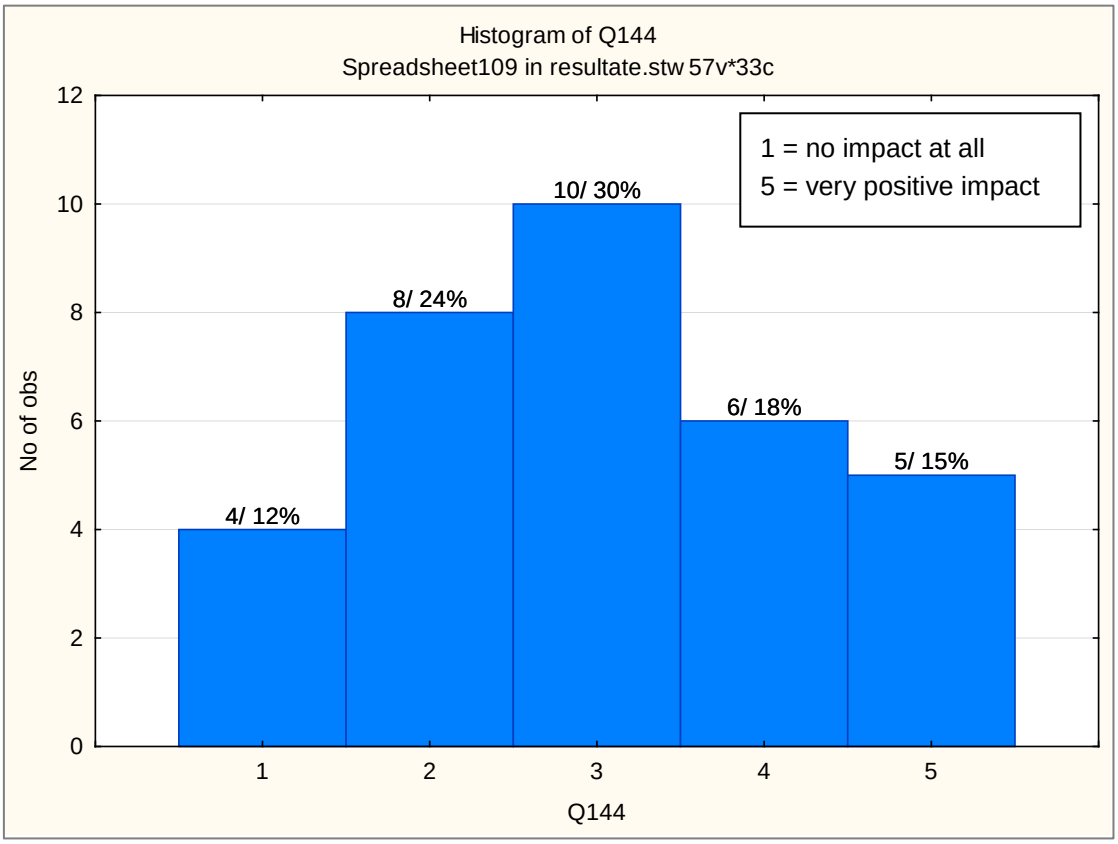

Figure B.8: Rating of the impact of green initiatives on reputation and public image

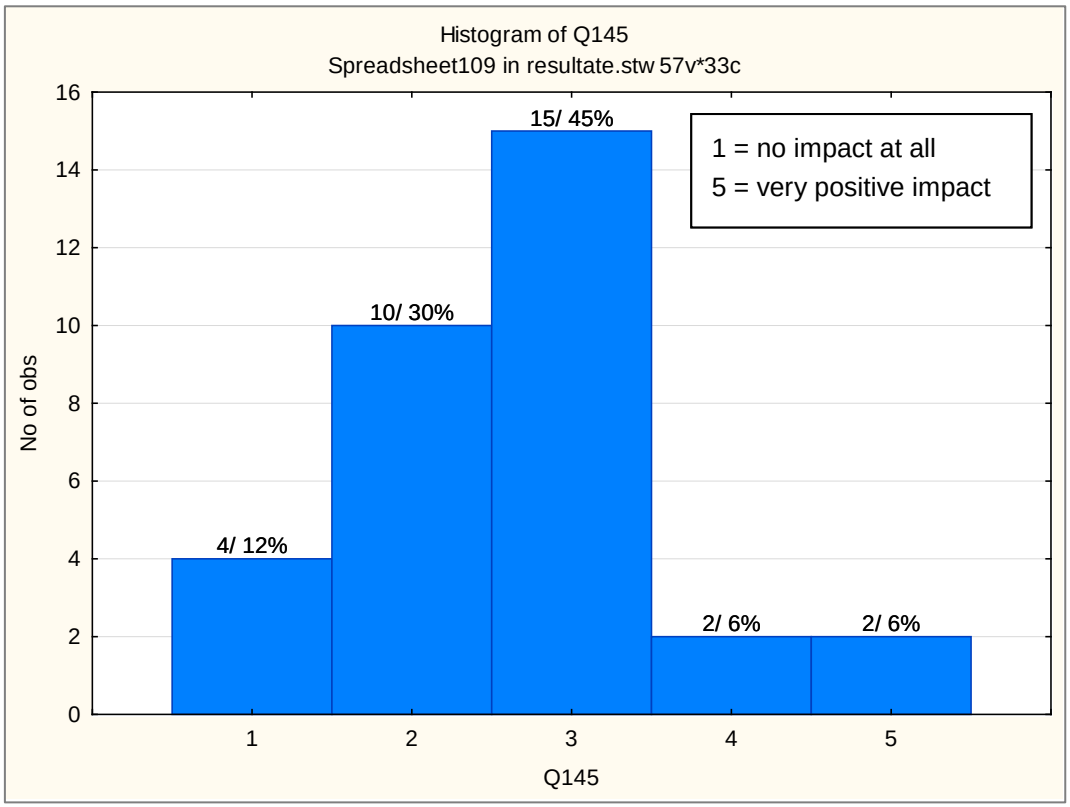

Figure B.9: Rating of the impact of green initiatives on competitiveness with other hospitals

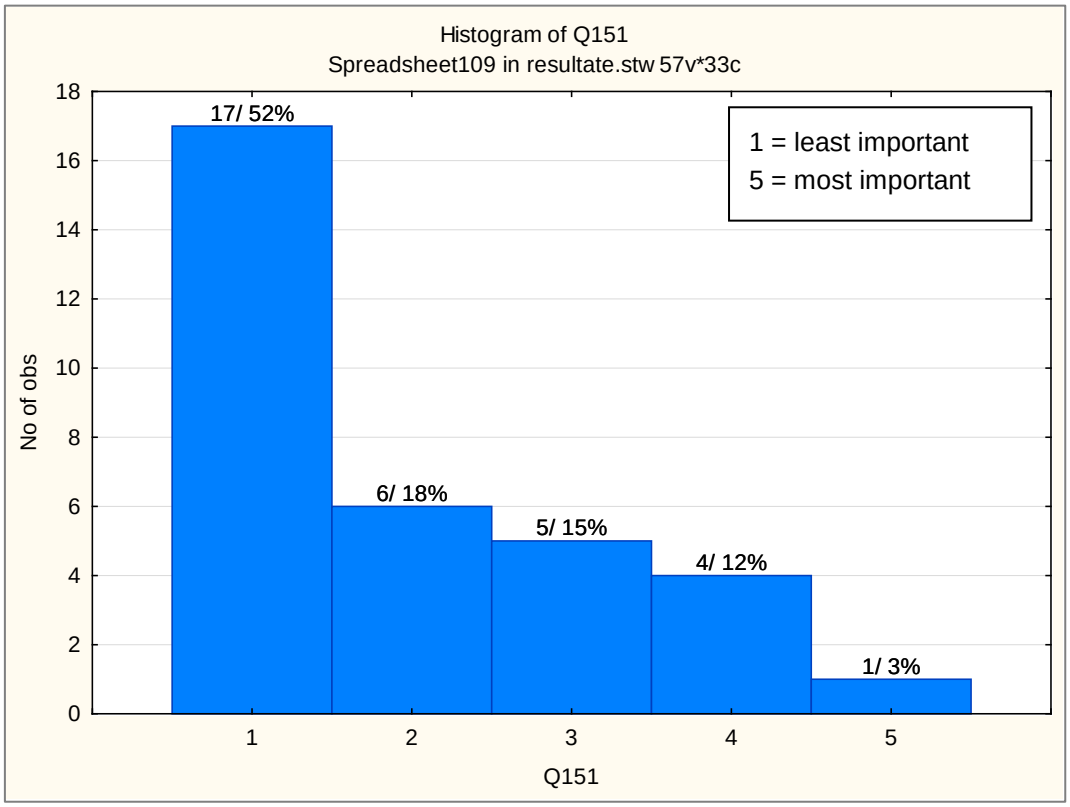

Figure B.10: Rating of the potential to gain a competitive advantage

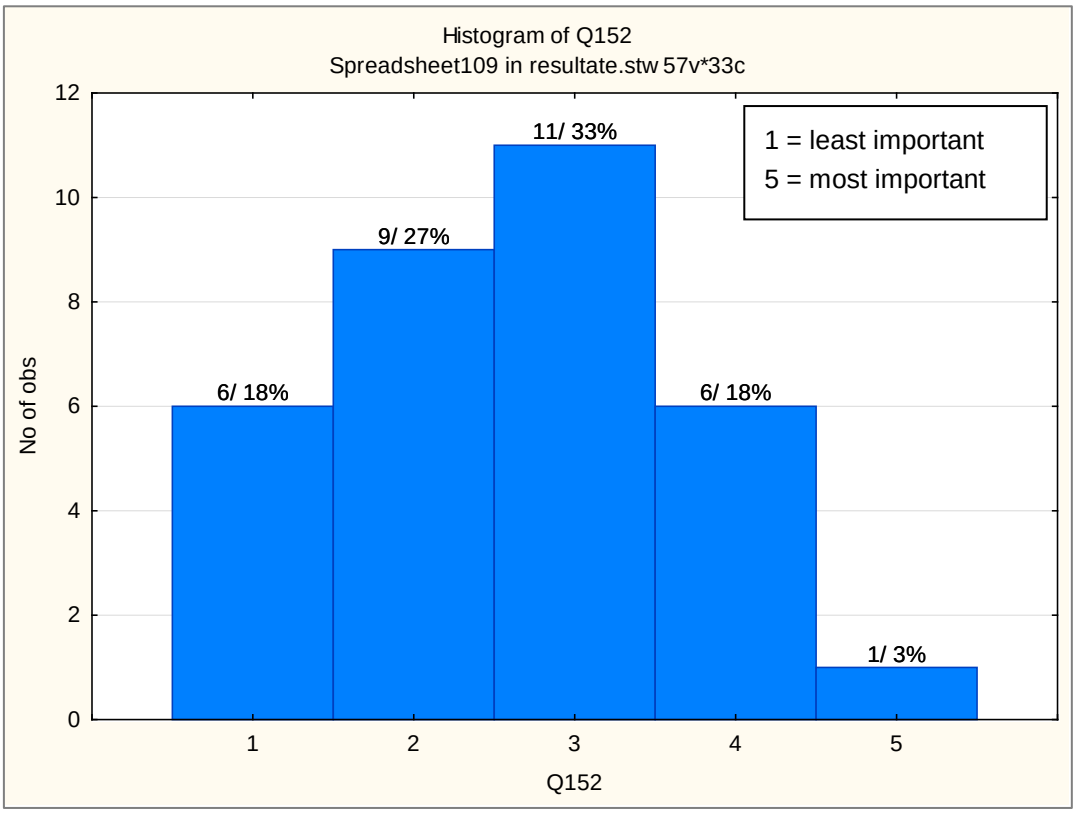

Figure B.11: Rating of the potential to improve patient care

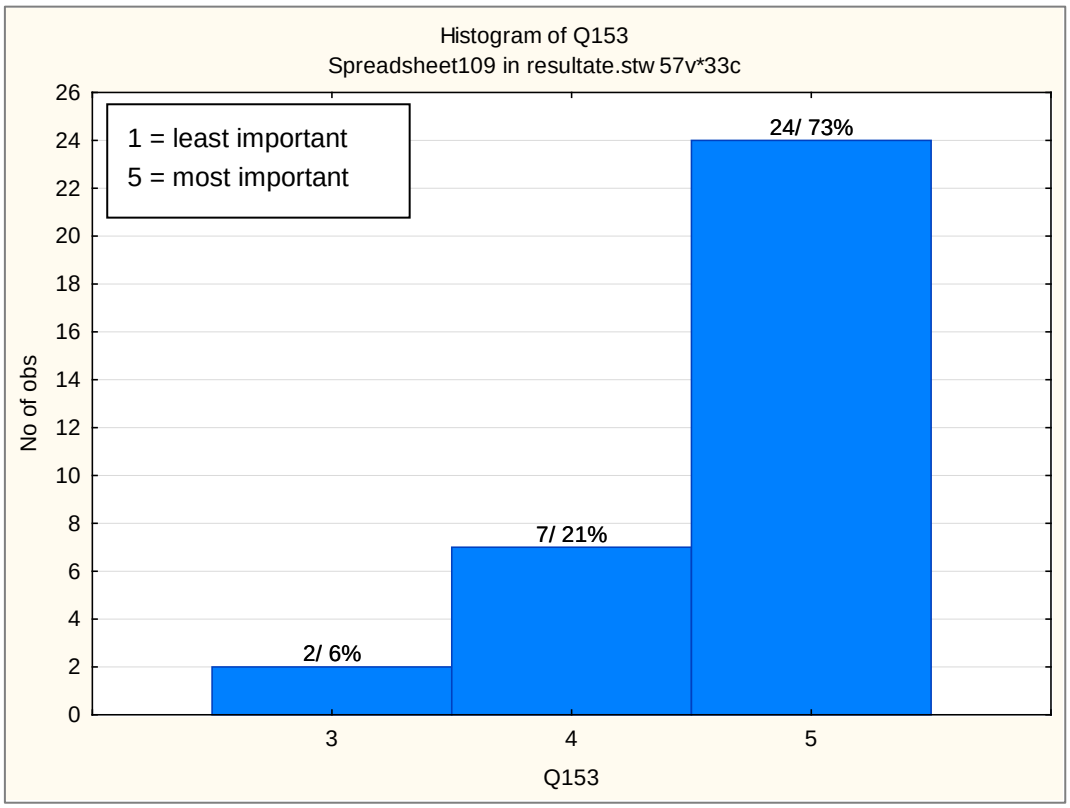

Figure B.12: Rating of the potential to reduce costs

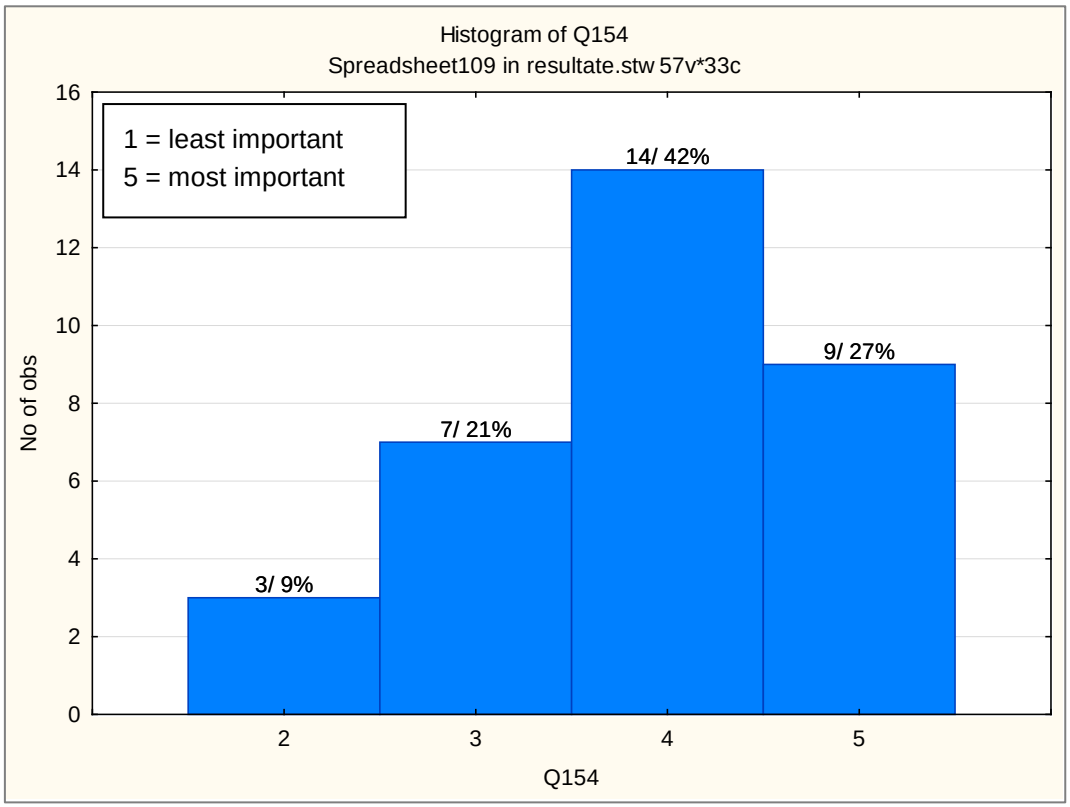

Figure B.13: Rating of 'it is morally and ethically the right thing to do'

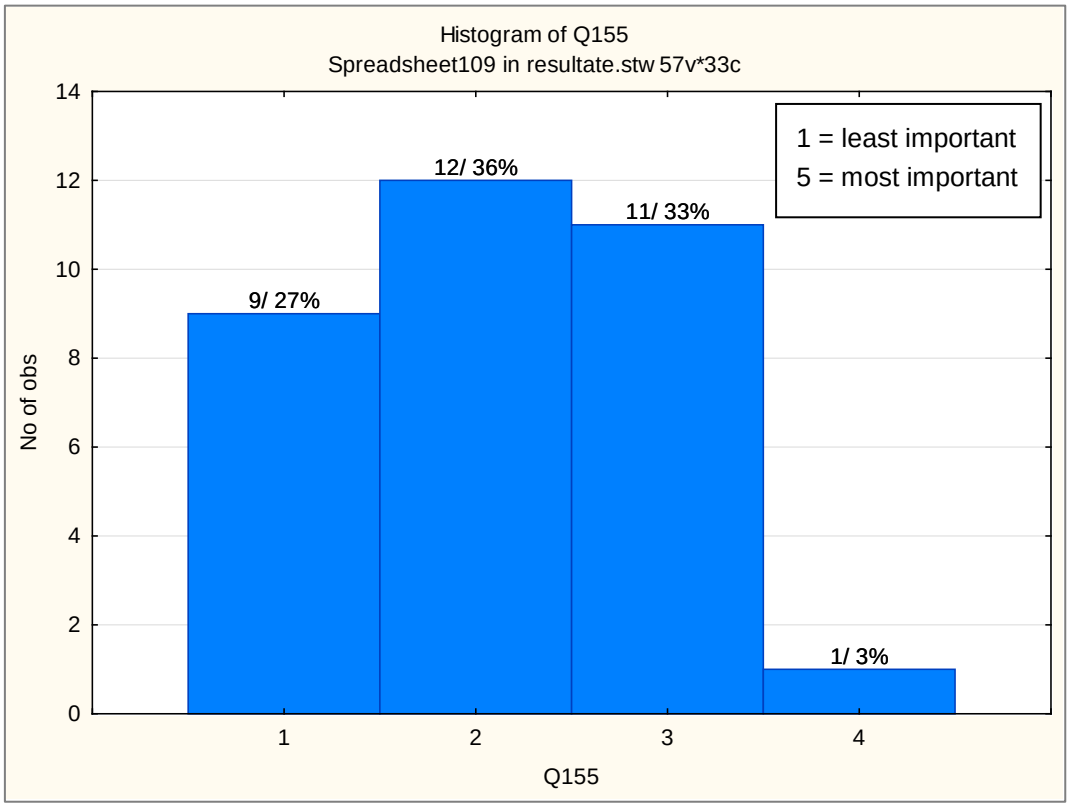

Figure B.14: Rating of 'it is an expectation by the general public'