Brave Creatives:

Research Partnerships Between Universities and Companies in the Creative Sector

by

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Abstract

This study examines the opportunities and challenges of research partnerships between universities of art and design and companies. Using qualitative phenomenological research methodology, fifteen interviews were conducted with university faculty, company directors and government research-funders.

The study's findings indicate that while universities of art and design have become more willing to form partnerships with companies, this relationship is underpinned by two significant incentives. First, the importance of government funding as an enabler of university-industry research partnerships cannot be understated. Second, there is a significant driving force for businesses to source talent and hire students and university graduates. Also evident in the results of the study is the shifting cultural gap that exists between universities and companies. This cultural gap begins with a weighty disparity in objectives. Companies are driven by product cycles and profits and seek to protect research results, while universities are driven by societal needs and seek to create and disseminate new knowledge. Despite the cultural differences, this study shows that the university community is gradually adopting the attitudes and values of the business community. There is a growing presence, and quite possibly dependence, on commercial activities such as university-industry partnerships, which support the corporatization of universities. Yet, despite their differences, the majority of study participants from universities, companies and government funders regarded their research partnerships as sustainable models of innovation.

An indisputably collaborative endeavour at best, university-industry research partnerships unleash talent and spark innovation. At worst, they undermine academic freedom and impede curiosity-driven research. While focused on university-industry research partnerships, this study raises issues far beyond universities and companies by offering a glimpse into the inescapable contagion of public-private partnerships within public institutions.

Keywords: Post-secondary education; university-industry research partnerships; public-private partnerships; sustainable innovation; marketization of public universities; neoliberalization of education; creative industries

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BC   British Columbia

CAUT   Canadian Association of University Teachers

CIHR   Canadian Institute of Health Research

G8   Group of eight highly industrialized nations

GDP   Gross Domestic Product

IP   Intellectual Property

NCE   Network Centre of Excellence

NSERC   Natural Science and Engineering Research Council

OECD   Organization for Economic Co-operation and Development

R&D   Research and Development

RDT   Resource Dependency Theory

SFU   Simon Fraser University

SME   Small and Medium Enterprise

SSHRC   Social Sciences and Humanities Research Council

STEAM   Science, Technology, Engineering, Art, Mathematics

STEM   Science, Technology, Engineering, Mathematics

UBC   University of British Columbia

UK   United Kingdom

UNESCO   United Nations Educational, Scientific and Cultural Organization

USA   United States of America

WEF   World Economic Forum

Glossary

University-industry research partnerships	The term university-industry research partnership refers to research partnerships between universities and companies that seek to solve practical problems and have relevance to the university and a company, sector or industry. Within a university's mandate, research partnerships use parts of the university's knowledge, methods, equipment and technologies for a specific company or sector
Creative sector	The creative sector is an umbrella term housing the creative industries. Business enterprises such as: advertising; architecture; broadcasting; film and television; visual arts; digital and on screen media; design; and publishing are examples of creative industries (UNESCO, 2013). What these industries have in common is that they create content and use creativity, skill and, in some cases, intellectual property to create products and services with social and cultural meaning while they generate economic benefits (UNESCO, 2013)
Knowledge transfer and knowledge exchange	Knowledge transfer refers to knowledge that is passed from universities to companies. Knowledge exchange refers to this process as a collaborative dialogue between multiple parties. It describes not simply transference of knowledge, but a process that is more generative, multi-partied and back and forth between universities and companies
Small and medium sized enterprise	Small and medium sized enterprise (SME) is an umbrella term that refers to small companies with under 100 employees and medium sized companies with under 499 employees
Talent acquisition	Talent acquisition refers to the hiring of university faculty, staff and students by companies
Knowledge economy	Knowledge economy refers to an economy where the value of goods and services bought and sold is attributed to the knowledge embedded in them and where economic progress depends more upon the creation and application of new knowledge than with capital accumulation, or utilization of more natural resources (Williams as cited in Temple, 2012)

Chapter 1.

Introduction

This study examined research partnerships between universities of art and design and companies involved in Canada's creative sector. Its goal was to unearth the challenges and opportunities in these research partnerships and identify whether they are sustainable models for innovation, for either universities or companies, or both. Motivating this study was the recognition that there is a profound shortage of literature on research partnerships between universities of art and design and companies. Therefore, little was known about the challenges and opportunities of these research partnerships or whether they are sustainable models of innovation.

Companies working with, engaging with, and forming research partnerships with universities of art and design have become more commonplace over the last ten years. In this study, fifteen Study Participants talked about their experiences of these types of research partnerships. Researchers, practitioners, academics, company directors and government funders explained their thoughts and gave their opinions and ideas. This study provides an analysis of university-industry research partnerships in the creative sector and has filled a void in contemporary literature.

To better understand research partnerships between universities and companies in the creative sector, it is important to understand their history and social, economic and political context. The creative sector is made up of organizations involved in the application and development of content-driven digital media, visual arts, design, advertising, architecture, broadcasting, film and television, and publishing, to name a few (UNESCO, 2013). While this study takes place in Canada, more broadly, the United Kingdom's Department of Culture, Media and Sport (DCMS) describes the creative industries more as, "Those industries which have their origin in individual creativity, skill

and talent and which have potential for wealth and job creation through the generation and exploitation of intellectual property" (2015, p. 4). The creative sector has become more so recognized as its own entity, economically and socially, over the last two decades and this context is discussed further in this study.

Twenty years ago few would have predicted the current importance of the creative sector and the creative industries to the Canadian economy. Trade in global creative goods and services has enjoyed rapid growth over the past two decades, and it is widely believed that this trend will continue (Ryerson, 2013). Richard Florida, who is known as a strong proponent of the creative sector, suggested that, "Human creativity is the ultimate economic resource" (2002, p.xiii). The creative sector, its universities of art and design and companies, have become increasingly important to the overall economic well being of Canada.

While making a meaningful contribution to Canada's economy, the creative sector has also, more recently, been recognized as a powerful entity in many other countries. Globally the creative sector workforce is highly educated with university and college graduates making up the majority of employees (Universities UK, 2009). Around the world there are hundreds of universities of art and design, special purpose institutes and colleges rooted in the creative sector.

Commonly, research has been central to a university's growth. This has always been especially evident in universities offering the science, technology, engineering, and mathematical subjects (STEM). Over the last decade research has become increasingly central to the growth of universities of art and design (ECUAD, 2013; NSCAD, 2013; OCAD, 2012) and this has provided a central theme within this study. It is widely acknowledged that research contributes to a university's fiscal growth, prestige and public recognition. Universities of art and design have more recently embraced this notion and it is from that backdrop that this study has grown.

University-industry research partnerships have become more significant to universities of art and design. Many have argued that there have been increasing pressures on university researchers in all sectors to be relevant to industry, commercialize their research results and build opportunities that lead to employment for

their students and graduates. One of the largest government research councils in Canada stated that, in the last three years, there had been "a sixty percent increase in businesses doing partnered research with universities and colleges" (NSERC, 2013, p. 1).

Over the last fifteen years we have witnessed publicly funded art and design institutions being awarded university status. This has happened nationally and internationally. Three recent examples of this in Canada are: the former Emily Carr Institute of Art and Design, now known as Emily Carr University of Art + Design; the former Nova Scotia College of Art and Design, now known as NSCAD University; and the former Ontario College of Art and Design, now known as OCAD University. Although acquiring university status has affected many aspects of their roles, of most interest to this study is their increase in research and, more specifically, university-industry research partnerships. This increased practice of research was captured in an article in University Affairs (2014):

> As all three of Canada's major art and design schools – Emily Carr, Toronto's OCAD University, and Halifax's NSCAD University – transitioned to universities over the past 15 years, they sought to broaden their scope and appeal by offering a wide array of design and media programs and fostering research capabilities…Companies can come for help solving research problems. Some students who worked on these corporate projects were later hired by those companies. (Tamburri, p.1-2, 2014)

As a result of their change in status from colleges/institutes to universities, the new universities of art and design became eligible to apply for a range of research grants, particularly from government research funding agencies. And, as is evident in the statement above, companies have been coming to universities of art and design to find help to solve their research problems.

Within their most recent Strategic Research Plans, all three universities of art and design referred to an increase in their commitment to funded research and made particular mention of research that partners with industry (ECUAD, 2013; NSCAD, 2013; OCAD, 2012). Universities of art and design, like many other universities and colleges

around the world, have expanded their research mandates and practices to include university-industry partnered research.

There is a relatively new role for universities of art and design and companies within the realms of university-industry research partnerships and, subsequently, this has created opportunities and challenges. Universities and companies that have partnered in research have created opportunities for the development of new processes, products or services, often referred to as innovation. This has also created the opportunity for companies to hire university talent. Alongside these opportunities, there have also been challenges associated in partnering universities from the public sector, with companies from the private sector. Historically, these two sectors have had very different cultures with different objectives (NSERC, 2012). If the World Economic Forum's claim that "talent-driven economies are the best equipped to adapt to the changes brought about by this so-called fourth industrial revolution and reap their benefits" (p. 32, 2015), it is plausible to assume that these partnerships will become increasingly important in providing university research to companies in the future. By examining these research partnerships, this study has presented new insight and understanding.

Statement of the Problem and Justification for this Study

Core government funding for Canada's universities of art and design, like many other universities, has decreased over the last decade (ECUAD, 2013; NSCAD, 2013; OCAD, 2012). Nationally and internationally universities have been tasked with diversifying their revenue sources. Within the most recent Strategic Research Plans of universities of art and design, it was common to see references to an institutional push to increase funding from diverse sources such as government research-funding agencies and the private sector (ECUAD, 2013; NSCAD, 2013; OCAD, 2012). Increasingly universities of art and design have existed by balancing an assortment of government, non-government and private sector funding for both their core and supplemental activities.

Government funding for research that entails partnerships between universities and companies has somewhat increased. Reports vary on the extent of this increase. On the one hand it has been reported that spending on this type of research in higher education has increased by 150% over the past decade (Canadian Council on Learning, 2011). On the other hand, the 2015-2016 *Global Competitiveness Report* from the World Economic Forum reported a significant drop in Canada's world standing in some key areas. In the category of university-industry research partnerships, Canada ranked nineteenth in the world in 2015-2016, compared with its ranking in 2009-2010 of seventh. This could point to a disinvestment from the Canadian government, or companies, or both. Notwithstanding that, in Canada the federal and provincial governments have funded university-industry research partnerships and, in particular, research partnerships between universities and small and medium sized companies (SMEs) in research-intensive research universities and, more recently, universities of art and design.

SMEs were chosen for this study because the importance of SMEs to the Canadian economy cannot be overstated. SMEs drive Canada's economy, collectively accounting for 70 to 80% of new jobs in Canada (Association of Canadian Community Colleges, 2010). A small company is defined in policy as one with fewer than one hundred employees and a medium-sized company is defined as one with one hundred to four hundred and ninety-nine employees (NSERC, 2013). It has been widely acknowledged that most SMEs lack adequate funds to conduct research (McGill University, 2011). It is because of this that this study is most interested in research partnerships between universities of art and design and SMEs.

Over the last decade Canada has put fewer resources into research and development than many other countries. In addition to the 2015-2016 *Global Competitiveness Report* from the World Economic Forum that shows Canada's lagging performance with innovation, the Organization for Economic Co-operation and Development's (OECD, 2010) statistics on research and development (R&D) showed that Israel continued as the OECD country with the largest R&D as a percentage of Gross Domestic Product (GDP) at 4.40, followed by Finland at 3.88 and Korea at 3.74. In comparison, Canada's investment in R&D, as a percentage of GDP, in 2010 was

1.85. This ranked lower than the United States' ranking, which was reported as 2.90% and the OECD's overall average of 2.40%. Among the G8 countries, Canada's investment in R&D ranked fifth (Statistics Canada, 2013).

A confluence of political and economic factors that have enabled universities of art and design to partner with SMEs. One key factor in this convergence has been the government research funding that has provided funding for university-industry partnered research. While older and larger universities within the STEM subjects have a strong history of involvement in research partnerships with companies, universities of art and design are relatively new to this landscape. This relative newness provides a central backdrop within this study.

Purpose Statement

This study investigated the opportunities and challenges presented in research partnerships between universities of art and design and SMEs. In order to provide an in-depth account of these types of university-industry research partnerships, this study asked fifteen study participants the following seven questions. The questions came from my own experience working within university-industry research partnerships. The questions were:

1. Based on your experience, what do you think the factors are that support the initiation and development of research partnerships between universities of art and design and companies/SMEs?

2. What do you think the factors are that hinder the initiation or development of research partnerships between universities and companies/SMEs in the creative sector?

3. What are the current models of university-industry research partnerships that you are aware of, and to what extent do these models function effectively? Are there elements you might like to change?

4. Can you talk about any political, environmental or economic influences and considerations associated with university-industry research?

5. As a research project between a university and SME progresses, what do you think, generally, are the internal and external elements that contribute to, first, a research project's sustainability; and second, a research project's demise?

6. How would you define success in university-industry research partnerships? What are some of the benchmarks and success indicators you have used, or currently use?

7. Do you think research partnerships between universities and companies are sustainable models for innovation (for example, new products, services, etc.) in universities and companies?

The seven questions were designed as open-ended and were intended to create an opportunity for each Study Participant to describe their experiences in university-industry research partnerships. The questions were also designed to encourage reflection and constructive analysis of university-industry research partnerships. The data collected from the interviews were examined and presented in Chapters Three, Four, and Five.

Situating the Researcher

My interest in university-industry research partnerships within the creative sector grew during my undergraduate studies in visual arts and a graduate degree in business management. With experience studying and working in universities, NGOs and companies, I actively sought out opportunities that brought companies onto campuses. Historically, like many other sectors, companies and universities within the creative sector have developed very different cultures. On the campuses of universities of art and design this has provided robust, spirited dialogue.

In the early 2000's, I, alongside my colleagues, watched the creative sector embrace emerging technologies, digital media and screen-based communications. More recently, I have observed universities of art and design and companies become more willing bedfellows. Many of the early-stage partnerships were built around digital media content design, development and production. It could be argued that partnerships between universities of art and design and companies have become more commonplace.

The partnering of universities of art and design with companies is, in essence, the partnering of the public sector with the private sector. While this has presented many opportunities, it has also had its challenges. Presenting both a challenge and opportunity, there has been a belief that partnered research between universities and

companies detracts from curiosity driven and pure research. This belief was discussed in the interviews within this study and is examined in later chapters. This study is designed to be the first step to a more comprehensive understanding of university-industry research partnerships within the creative sector and quite possibly beyond.

Significance of the Research Problem

This study contributes to a body of knowledge that fits into the creative, business, technology and education sectors. There is a shortage of literature focused specifically on research partnerships between universities of art and design and companies. Research partnerships between universities of art and design and companies, although on the increase, are a fairly emergent practice. This is in contrast to other sectors, such as those in the science, technology, engineering, and mathematics fields (STEM) where university-industry research partnerships have had a much longer history and are more commonplace. This study has given voice to those who have been directly involved in university-industry research partnerships. It includes researchers, practitioners, academics, companies and government funders. The study is especially timely in a political and economic landscape that offers government funding opportunities for universities and companies, and particularly SMEs, that partner in research.

Overview of Methodology and Methods

Qualitative Research

This study uses the tradition of qualitative research and the genre of phenomenology and as such is built around fifteen semi-structured interviews. Creswell (2011) described how qualitative researchers collect data through "examining documents, observing behaviour, and interviewing participants" (p. 45). He described how qualitative researchers used instruments such as open-ended questions. Qualitative researchers review all of the data and "make sense of it, organizing it into categories or themes that cut across all of the data sources" using inductive and deductive logic (Creswell, 2011, p. 45). Qualitative researchers build their "patterns, categories and themes from the bottom-up by organizing the data inductively into increasingly more

abstract units of information" (Creswell, 2011, p. 45). Creswell's description of how qualitative researchers collect and interpret data is reflective of how data were handled in this study.

Phenomenology

The genre of phenomenology was used in this qualitative study so that the lived experiences of the study participants could be both interpreted and reported. Phenomenology has been used to investigate the different ways in which people experience something or think about something (Marton, 1986). Researchers in the social sciences who focus on generating data to examine participants' lived experiences have made use of phenomenological interviews (Raulston, 2010).

This study was suited to a phenomenological approach as it interprets and reports the experiences of a range of study participants, in this case from the public, private and governmental sectors. It has been suggested that researchers first turn to a phenomenon when an "abiding concern" seriously interests them (van Manen 1990, as cited in Creswell, 2007). Creswell described this as,

> The type of problem best suited for this form of research is one in which it is important to understand several individuals' common or shared experiences of a phenomenon. It would be important to understand these common experiences in order to develop practices or policies, or to develop a deeper understanding about the features of the phenomenon. (Creswell, 2007, p. 60)

The two main branches of descriptive and interpretive phenomenology have become common philosophical approaches in qualitative research. Edmund Husserl (1900/1970) is widely acknowledged as the father of phenomenology in the twentieth century. One of the defining features of his work on phenomenology was to define the essence; Husserl distinguished between conscious knowledge and the phenomena at which the consciousness is directed (Laverty, 2003). Husserl stressed intentionality and advocated that human experience is the source of knowledge (1900/1970). Martin Heidegger, who was Husserl's student, built new concepts into phenomenology, which came from philosophers in diverse areas such as psychology, sociology, and education. Heidegger believed that humans are influenced by their lifeworld and he acknowledged

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that both the researcher and the participants bring their perspectives to an understanding of the phenomena (1927/1962), While Husserl's phenomenological philosophy was intended as a descriptive practice, Heidegger argued that the phenomenological approach was interpretive. Both Husserl and Heidegger's descriptive and interpretative models provided a foundation for this study.

In this qualitative phenomenological study, participants were asked about their experiences within university-industry research partnerships. They were asked questions that helped them reflect on and analyze their experiences. From this, patterns, intricacies, commonalities and distinctions, within and across, each interview participant and group were identified. These were then sorted into themes and presented within the study results.

Other data collection methods in this study involved gathering and analyzing university strategic research plans, local, national and international government and non-governmental reports and policy documents (e.g. Tri-Council Agencies, World Economic Forum, Conference Board of Canada). These documents were analyzed for terminologies, patterns, priorities, trends, and forecasts.

Interviews

Within this study there were fifteen study participants. Open-ended interview questions were used because they offered the interviewees the chance to "tell a story, and generate detailed descriptions about topics of interest to the interviewer" (Raulston, 2010, p. 12). This process allowed the interviewer the opportunity to ask "follow-up questions, or 'probes' that incorporated the interviewee's words" (Raulston, 2010, p. 12). Using a semi-structured approach in the interviews, the questions were used as a guide, with follow-up probes. The interview technique was "working towards an articulation of the interviewee's reflections on experience" (Marton & Booth, 1997, p. 130). As such, the results use words and phrases that are the same as the words and phrases that were used by the interviewees.

Theoretical Framework

This study was informed by two main theories, Resource Dependency Theory (RDT) and Institutional Theory. I intended to examine my data through the lenses of the two theories in order to assess whether or not the theories had validity given the data, either partial or complete, or not at all. As well, the theories provided useful frameworks for the interpretation of data once I analyzed the results. While it was hoped the theories would help me interpret the results of my interviews, they were also chosen because they reflected my own experience in working with university-industry research partnerships.

Whereas it is useful to look at resource dependency and institutional theories individually, it must be noted that they also relate to each other with varying levels of interdependence. Within this section I will introduce each of the two theories and then expand on each one more extensively in Chapter Two, the Literature Review.

Resource Dependency Theory

Resource Dependency Theory (RDT) came to the forefront in 1978 with Pfeffer and Salanick's work. This theory acknowledged the strong influence of external resources on institutions. Pfeffer and Salanick (2003) asserted that an institution's survival is dependent on its ability to acquire and maintain resources and that an organization is bound up with the conditions of its environment. Resource Dependency Theory supported the notion that no organization is completely self-contained (Pfeffer & Salanick, 2003).

University-industry research partnerships are almost always dependent on one, or more, external funding sources. With many of a university's key dependencies being external, many have rightly questioned the notions of a university's autonomy and independence and this will be discussed further within the study. Resource Dependency Theory provided a useful frame in which to interpret the results of the interview data from this study.

Institutional Theory

The work of DiMaggio and Powell identified Institutional Theory in 1983. Whereas Resource Dependency Theory is rooted in external forces, Institutional Theory recognizes how institutions and organizations are impacted by their internal cultures and norms. Scott (2004) increased our understanding of those internal forces with the following explanation.

> Institutional theory attends to the deeper and more resilient aspects of social structure. It considers the processes by which structures, including schemas, rules, norms, and routines, become established as authoritative guidelines for social behaviour. It inquires into how these elements are created, diffused, adopted, and adapted over space and time; and how they fall into decline and disuse. (p. 2)

Institutional Theory, then, explained observable and influential behaviours within organizations and may help us better interpret the results of the interview data within this study.

Resource Dependency Theory and Institutional Theory are closely linked. They take into account the institution's internal and external influences. DiMaggio and Powell (1983) offered an insight into the depth of this type of influence, "The greater dependence of an organization on another organization, the more similar it will become to that organization, in structure, climate and behavioural focus" (p. 154). This is interesting to this study in that it offers a lens through which to reflect on public-private partnerships. Both Institutional Theory and Resource Dependency Theory provided useful lenses in which to view the data in this study.

Summary

Motivating this study was the recognition that there is a shortage of literature on research partnerships between universities of art and design and companies in the creative sector. Little was known about the challenges and opportunities of these partnerships. This study employed phenomenological methods of inquiry and qualitative data collection methods such as interviewing. Two theories were used as lenses to help

interpret and understand the study findings. These were Institutional Theory and Resource Dependency Theory.

In carrying out the literature review for this study, which makes up the next chapter of the study, it was found that there was a scarcity of literature on research partnerships between universities of art and design and companies in the creative sector. Little, if anything, was documented on the challenges and opportunities of these partnerships or whether they were sustainable models for innovation. Using the literature available on the larger practice of university-industry partnerships in the STEM sectors, and the data from this study, a gap in contemporary literature has narrowed in size.

Chapter 2.

Literature Review

Introduction

This literature review consists of seven sections. Each focuses on components that were thought to be integral in gaining a full understanding of university-industry research partnerships in the creative sector, and beyond. The first section presents an explanation of the terminologies used within this study. The second section presents the history of university-industry research partnerships. The third presents government policies and practices in regard to university-industry research partnerships. The fourth describes the different types of university-industry research partnership models that have been and are currently in existence. The fifth describes general critiques towards university-industry research partnerships. The sixth section describes the differences in organizational cultures between universities and companies. The last section in this chapter describes the theories used to help interpret and better understand the data gathered in this study.

This study examined research partnerships between universities of art and design and companies involved in Canada's creative sector. Motivating this study was the recognition of a shortage of literature on research partnerships between universities of art and design and companies. Little was known about their challenges, opportunities and whether they have been sustainable models of innovation. Companies forming research partnerships with universities of art and design have become increasingly more commonplace over the last ten years. And, if the World Economic Forum (2015) claim is correct that "talent-driven economies are the best equipped to adapt to the changes brought about by this so-called fourth industrial revolution and reap their benefits" (p.

32), then partnerships like the ones examined in this study will become even more important in the future.

In fifteen semi-structured interviews, public and private sector personnel talked about their experiences of university-industry research partnerships. Researchers, practitioners, academics, company directors and government research funders presented their thoughts, opinions and ideas. This study provides an analysis of these types of university-industry research partnerships and has filled a void in contemporary literature.

Research partnerships between universities of art and design and companies, while on the increase, are a relatively emergent practice. This is in contrast to other sectors like those in the science, technology, engineering and mathematics fields (STEM), where university-industry research partnerships have had a much longer history and are more commonplace. While surveying the literature, I found that there was little or no literature on university-industry research partnerships between universities of art and design and companies in the creative sector, yet there was a substantial body of literature on university-industry research partnerships in the STEM sectors. In addition to that, there was a very small amount of very recent literature on university-industry partnerships within the broader social sciences. Literature focused on STEM and social sciences described the overall history and social, political and economic context of the evolution of university-industry partnerships. Whereas that literature contributed towards a wider understanding of university-industry research partnerships in the STEM and social sciences, to a much lesser degree it provided insights into research partnerships in the creative sector.

In addition to reviewing the literature on university-industry research partnerships in the STEM sectors, it was very useful to review literature focused on the rise of the knowledge economy and the rise in knowledge workers. The term *knowledge economy* has been used to describe the current economy, where economic progress depends more on the creation and application of new knowledge than on capital accumulation, harder work or utilization of more natural resources (Williams as cited in Temple, 2012, pg. 19). Given that the creative sector, its universities of art and design, and workforce

are heavily embedded in the knowledge economy, it makes sense to understand the knowledge economy more comprehensively.

The literature review of the knowledge economy helped provide a better understanding of the process of knowledge transfer, more recently referred to as knowledge exchange. Knowledge transfer and knowledge exchange have been widely used to describe the way that ideas have been passed back and forth between companies and universities in all sectors. The rise in the knowledge economy, knowledge workers and knowledge exchange has become central to the growth of the creative sector, its universities of art and design and companies. This will be expanded on in later chapters in this study.

Motivating this study was the recognition of a scarcity of literature on research partnerships between universities of art and design and companies in the creative sector. Little, if anything, was documented on the challenges and opportunities of these partnerships or whether they were sustainable models for innovation.

Terminologies

Throughout the study various terms were used regularly. These were terms such as: the creative sector, small and medium sized enterprises (SMEs), university-industry partnered research, knowledge transfer and knowledge exchange, the knowledge economy and the knowledge worker. These terms are explained individually within this section of the literature review.

The Creative Sector

The creative sector has been used as an umbrella term that houses the creative industries. Business enterprises such as advertising, architecture, broadcasting, film and television, visual arts, digital media, design and publishing are examples of creative industries (UNESCO, 2013). What these industries have had in common is that they have created content and have used creativity, skill and, in some cases, intellectual

property to create products and services with social and cultural meaning while generating economic benefits (UNESCO, 2013).

There was evidence to support that the creative sector has become one of North America and Europe's growing economies. Trade in global creative goods and services had experienced rapid growth over the past two decades and it was widely believed that this trend would continue well into the future (Ryerson, 2013). The creative sector workforce has been identified as being highly educated, with university and college graduates making up the majority of its employees (Universities UK, 2009). The creative sector has become a well-educated and expanding sector of the economy. This sector is relevant to this study because the universities of art and design and companies discussed were typically rooted within the creative sector.

Small and Medium Sized Enterprises (SMEs)

The small business sector is made up of small and medium sized enterprises, often referred to as SMEs. This study uses the definition of a SME from the Natural Sciences and Engineering Research Council of Canada (NSERC). That is, a small enterprise is a company with fewer than one hundred employees; a medium-sized enterprise is a company with one hundred to four hundred and ninety-nine employees. A company with five hundred or more employees is considered a large company (NSERC, 2013) and was beyond the scope of this study.

Like many countries, Canada's economy has been heavily driven by its small business sector. Collectively over the last decade, SMEs have accounted for 70 to 80% of new jobs in the Canadian economy (Association of Canadian Community Colleges, 2010). A flourishing small business sector is claimed to be central to economic growth (Smith, 2011). Recognizing the importance of SMEs, the study focused on research partnerships between universities of art and design and SMEs.

University-Industry Research Partnerships

Within the context of this study, the term university-industry research partnership has been used to represent research partnerships between universities of art and design

and SMEs. These types of research partnerships purposely seek to solve practical problems that have been of relevance to the university and a company, sector or industry. Within a university's research mandate, research partnerships have used parts of the university's knowledge, methods, equipment and techniques for a specific company or sector.

Historically, this type of university-industry research was often synonymous with the terms applied, sponsored or contracted research. These terms often reflected the purpose and funding of this type of research. In this study I have focused mainly on research partnerships. While research is often tied to or synonymous with research and development (R&D), the development aspect is beyond the scope of this study. Placing development beyond the scope of this study is recognizing that development in a research project does not always take place within the university-industry partnership context. For example, in some research projects, companies choose to engage with universities on the research aspect of the project and develop at a later stage or within the company. Government research grants or a mix of both government and private sector research funding have typically supported the research partnerships referred to in this study.

The government of Canada's Tri-Council funding agencies have traceable histories of funding university-industry research partnerships in the science, technology, engineering and mathematics sectors (STEM), and less so, in the fields of social sciences and humanities. It is only more recently that universities of art and design have entered this government-funding realm. Universities of art and design and companies within the creative sector have become the relatively recent recipients of government research funding for university-industry research partnerships. This has helped them build, develop and formalize university-industry research. In describing its *Research and Development Grant*, the Natural Sciences and Engineering Research Council of Canada (NSERC) described it as "providing companies access to the unique knowledge, expertise and capabilities available at Canadian colleges and universities" (2012, p. 1). In describing NSERC's commitment to university-industry research partnerships further, NSERC stated,

We must maximize the opportunity created when industry and academia work together to solve challenging problems. Through partnerships that bring together the collective creativity, expertise and resources of these two sectors, we can convert challenges into opportunities and build the Canadian economy. (2009, p. 3)

The impacts and influences of government funding for this type of university-industry research are significant and will be discussed more in-depth throughout this study.

This study has chosen to present university-industry research as a collaborative dialogue between multiple parties. It has used the term university-industry research to describe not simply transferring knowledge from universities to companies, but also a process that is more generative, iterative, multi-partied and back and forth. While it was recognized that this multi-partied back and forth has not always been the case, it was, albeit optimistic, the starting point for this study.

Supporting the notion of collaborative dialogue between universities and companies, there has been a gradual shift from using the phrase knowledge transfer, which described the knowledge passed from universities to companies, to using the phrase knowledge exchange, which describes the passing of knowledge back and forth between companies and universities. The reasons behind this shift have been explained in more detail in the next section.

Knowledge Transfer and Knowledge Exchange

Historically the term knowledge transfer has been used to describe the knowledge that was passed from universities to companies. More recently there has been a shift. Knowledge transfer has more recently been referred to as knowledge exchange. Knowledge exchange supports the process of universities partnering with industry as a collaborative dialogue between multiple parties. The term knowledge exchange has described not simply transference of knowledge, but also a process that has been more generative, multi-partied and back and forth between companies and universities. For example, a SME may have made a discovery that it had then taken to a university for further research. The university then had developed the discovery further and taken it back to the SME for further work on manufacture and practical application.

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With particular reference to SMEs and knowledge exchange, Smith states, "Knowledge exchange is an activity where SMEs receive business support working with higher education institutions to tap into the knowledge and expertise within universities in order to develop the business" (2011, p. 2). Knowledge being passed back and forth between universities and companies is not new and increasingly more commonplace. Current day knowledge exchange is characteristically rooted in the knowledge economy. The knowledge economy is in many ways relevant to this study, which is discussed in more detail in the next section.

The Knowledge Economy and the Knowledge Worker

Peter Drucker introduced the term 'knowledge economy' in 1966. Drucker described what he had seen as the main difference between manual workers and knowledge workers. Manual workers, Drucker stated, worked with their hands, while knowledge workers worked with their heads and produced ideas, knowledge and information (Drucker, 1966). While Drucker's comparison was offered in the 1960's, more recently, Temple (2012) offered a slightly different interpretation of the same theme. Temple suggested that the industries of the past relied heavily on workers' tactical knowledge. In contrast, the workers of the twenty-first century embody large quantities of formal, codified knowledge in their products and services (Temple, 2012). Both Drucker's and Temple's statements provide a step towards understanding how the knowledge economy is entwined with universities. Williams provided a useful description of the unique relationship between the university and the knowledge-based economy: He stated,

> A high percentage of the value of goods and services bought and sold is attributable to the knowledge embedded in them and economic progress depends more on the creation and application of new knowledge than with capital accumulation, harder work or utilization of more natural resources. Higher education is concerned with the creation, dissemination, accumulation and retrieval of knowledge. It is reasonable to infer, therefore, that universities and colleges make a significant contribution to a successful knowledge economy. (Williams as cited in Temple, 2012, p. 19)

William's quote describes the prevailing emphasis placed on the creation, dissemination, accumulation and retrieval of knowledge within universities, and it could be argued, more recently, universities of art and design.

It is commonly acknowledged that the workforce of the twenty-first century does not resemble the workforce of the past (Temple, 2012). Increasingly the graduates of universities of art and design employed in the private sector can be found within areas such as digital media, emerging technologies, interactive design and publishing, to name a few. It is not too far a stretch to describe these areas as significant contributors to, and some would say drivers of, the knowledge economy.

Universities of the past were historically rooted in the 'ivory tower' image. More recently the public and private sectors, according to Temple (2012), are more likely to view universities not as an ivory tower, but as significant contributors to the local and global economy. Temple (2012) credits this shift to the university's increased proximity to the knowledge economy and the fact that it has become a producer of highly valued knowledge workers.

As knowledge is now created much faster than before, university policies and practices have been challenged in taking an active role in the ever-changing outputs of the knowledge economy. This has come at a time when universities, like many sectors, have been in the midst of major transformations and have sought to redefine themselves (Trani & Holsworth, 2010). This change has been centred on the growth of the knowledge economy, specifically its ever-changing career and business opportunities and digital outputs.

There has been a recent appreciation of not only the value of science, technology, engineering and mathematics (STEM) on innovation, but also the effects of art on innovation. There has been new inclusion within the STEM acronym, which now often reads as STEAM. This includes science, technology, engineering, *art* and mathematics. This up-and-coming inclusion of art has recognized the impact of art, and more broadly, the creative sector and its impact on the knowledge economy and innovation. Maeda (2011) described the value of STEAM in innovation by drawing our attention to how Apple™ products were designed by "artists, musicians, poets and

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zoologists". Maeda went on to say, "I thank Jobs and Apple for proving that art and design are poised to transform our economy in the 21st century, like science and technology did in the last century" (2011, p. 1). The transition from STEM to STEAM is emergent; however, statements like Maeda's have reinforced the idea that the creative sector and its universities of art and design have become more essential in the knowledge-based economy.

This section has identified and described the terms that have been used regularly in this study. The next section in this literature review looks at the history and evolution of university-industry partnerships in the STEM, social sciences and, much more recently, the creative sectors.

The History of University-Industry Research Partnerships

There have been university-industry research partnerships in the science, technology, engineering and mathematics sectors (STEM) for well over one hundred years. They were built on the development of scientific and engineering products and patents (Bowie, 1994). In the early 1900s, the Massachusetts Institute of Technology (MIT) became a leader in university-industry partnerships when it developed significant research partnerships with General Electric and AT&T (Cohen, Florida & Randazzese, 1996). In Canada, while fewer in number than the United States, there were also active science and engineering partnerships as early as the first half of the twentieth century (Bowie, 1994).

Governments and the support they have provided university-industry research partnerships have always been significant in the development of research between universities and companies. In the USA, university-industry partnerships were made significantly easier when Congress passed the Bayh-Dole Act in 1980. This act made it easier for universities to own and license patents on discoveries made through research paid for with public funds (Bok, 2003). Around the world many universities followed suit and constructed policies that made it easier to commercialize ideas, products and processes that came from university research. To support this innovation, Technology Transfer Offices and University Industry Liaison Offices opened on university campuses

in the 1980s. This change in policy and process helped in the formalization and professionalization of university research around the world.

In addition to government and university policies, companies have been changing how they do research. Over the last two decades, companies have downsized their research laboratories and contracted more and more of their research to universities (Smith, 2011). In world rankings, Canada lags in in-house company R&D (World Economic Forum, 2015, Conference Board of Canada, 2015). Government investment in public R&D (with universities and companies) has remained at the 8th and 9th spots in the world when compared with its international peers (Conference Board of Canada, 2015).

A recent example of university-industry research is IBM, a multi-national company, which in 2012 signed a multi-year research partnership agreement, of considerable size, with seven large Canadian universities. IBM contributed $175 million, pooled with $35 million in federal and provincial government funds to this university-industry research partnership (Bradshaw, 2012). This type of partnership has been viewed as providing access to the university's expertise and, in exchange has enhanced the university's research capacity for the development of transferable intellectual property (Smith, 2011). However, large research partnerships such as the one with IBM are not without their critics and this will be discussed in later sections of this study.

Further influencing the growth of university-industry partnerships we saw the beginning of an increase in universities offering many more PhD and Master's degrees in the 1970s and 1980s. Universities in general have produced many more students with master's degrees and PhDs than they could ever hire, and as Bowie (1994) stated, "they needed industry to absorb these students" (p.49). University-industry research partnerships have been viewed as a way to absorb students and graduates into industry based employment, creating a bridge between academia and industry.

In the history of university-industry partnerships, universities of art and design came into the realm in the 1990s (ECUAD, 2013; NSCAD, 2013; OCAD, 2012), which was considerably later than the STEM subjects. At this time a culmination of factors

supported this entry, namely the rise of the knowledge economy, and government research funding for university-industry partnerships.

Going forward, it is believed that there will be more attention to the outcomes of university-industry research partnerships and their growing relevance to innovation, economic development and regeneration (Trani & Holsworth, 2010). Governments and the support they have provided to both universities and companies have been important in the development of university-industry partnered research in the STEM and creative sectors. The next section of this literature review looks in more detail at government funding supports, policies and practices that have influenced university-industry research partnerships.

Government Policies and Practices

Government funding has been one of the main drivers of research partnerships between universities and companies. On the one hand it was reported that spending on research in higher education increased by 150% over the last decade (Canadian Council on Learning, 2011). On the other hand, the 2013-2014 World Economic Forum, *Global Competitiveness Report* (Klaus & Schwab, 2014) indicated that Canada had dropped in a number of world rankings, namely: university-industry research partnerships, company spending on research and development (R&D) and capacity for innovation.

Table 1.   Canada's Rankings in Global Competitiveness

Category	2009-2010 Canada's World Ranking	2013-2014 Canada's World Ranking	2015-2016 Canada's World Ranking
University-Industry Collaborations on R&D	7th	18th	19th
Company Spending on R&D	20th	29th	26th
Capacity for Innovation	19th	27th	23rd

Table developed from a synthesis of data from The World Economic Forum, *Global Competitiveness Report,* (Klaus & Schwab, 2014-15 Report and 2015-2016 Report)

In its category of university-industry research partnerships, Canada ranked nineteenth in the world in 2015-2016, compared with its ranking in 2009-2010 of seventh, which shows a significant drop. Similarly, as indicated in Table One, there was a drop in company spending on R&D, from twentieth in the world in 2009-10, to twenty-sixth in 2015-16. There has been much reported on Canada's lagging record in innovation (Government of Canada, 2011; NSERC, 2012). In its 2015-2016 *Global Competitiveness Report*, the World Economic Forum recommended that, "Canada should continue to foster innovation at the company level" (WEF, 2015, p. 25). As innovation indicators, the Conference Board of Canada has listed tangible measures such as trademarks, patents and public and private sector R&D spending levels (2014). Federal and provincial governments have been looking at ways to improve innovation and university-industry research has been believed to be one of the ways to boost Canada's lagging innovation. However, the significant drop in world rankings for university-industry collaborations from seventh in the world to nineteenth may indicate a de-investment in university-industry research from government and industry.

Notwithstanding the declining rates of university-industry R&D, education institutions have been regarded as having an important role in raising productivity of local businesses (Williams et al, as cited in Smith, 2011). As much of government policy and funding for university-industry research has become more focused on improving Canada's lagging innovation, universities are shifting to embrace these new funding models. Funding for university-industry research has consequently added "a new dimension to the way in which universities are funded" (Williams et al., Cox & Taylor, Robinson et al., as cited in Smith, 2011, p. 2).

A significant portion of government funding for university-industry partnered research in Canada has been provided by its Tri-Council Agencies. These research agencies are: The Natural Sciences and Engineering Research Council (NSERC), The Social Sciences and Humanities Research Council (SSHRC) and The Canadian Institute of Health Research (CIHR). NSERC, at the time of writing, the most active at funding university-industry research partnerships, articulated its rationale for supporting university-industry partnerships:

Opportunities are needed for people from industry and academia to get to know and understand the other sector. Professional exchanges enabling individuals to work in other sectors will increase the cross fertilization of ideas and improve overall communication. These exchanges will provide students and professors access to experienced entrepreneurs and will increase understanding of business and commercialization, resulting in the creation of more and stronger industry-academic research projects. (NSERC, 2009, p. 9)

NSERC's quote demonstrates various outcomes resulting from university-industry interactions. Showing the volume of university-industry research partnerships funded by NSERC, in its 2012 interim report on university-industry partnerships, it reported supporting 5,400 projects between 140 Canadian colleges and universities and 2,400 Canadian companies. This was a significant increase from 2009, when NSERC worked with 1,500 companies (NSERC 2012). Spending on university-industry research partnerships listed in NSERC's (2013) *Plans and Priorities* report showed the gradual increase in spending on university-industry partnerships from 2012 to 2015 from: $171 million in 2012-2013, to $191 million in 2014-2015.

In addition to the Tri-Council funding agencies, other provincial and federal government agencies have distributed funding for university-industry research partnerships in Canada, such as the Canadian Federation for Innovation, National Research Council, and in Western Canada, Western Economic Diversification and British Columbia Innovation Council. Whereas not all of these funders have been focused solely on university-industry partnered research, they have been working in areas where there have been many similarities and crossover. This was in the form of funding for innovation, mentorship, research infrastructure and business productivity.

On more of a global level, the Organization for the Economic Co-operation and Development (OECD, 2010) recommended that governments help universities reduce the barriers and regulations that limit effective interaction among universities and companies. Globally many governments have looked for ways to support university-industry research partnerships.

Though not the focus of this study, it is important to note that discussion has centred on what sorts of research funding had been increased, and just as critically,

what sorts of research funding had not been increased. It has been argued that funding for university-industry research is often at the peril of other types of research. Looking at this funding direction, opponents to university-industry research partnerships have raised important questions that ask whether universities are in an era of being co-opted by government research funding. Others are concerned that partnered research has existed at the peril of pure or curiosity driven research. James Turk, who at the time of writing was the President of the Canadian Association of University Teachers, said, "The evidence clearly suggests that a narrowing focus on commercialization can stifle the creativity and unexpected discovery fundamental to basic research" (Turk, 2015, p.5). These concerns have been looked at in more detail within the upcoming section, Critics of University-Industry Research.

Few would disagree that we are in an era where there is both provincial and federal government funding for particular types of research, those that have been focused on impacting innovation and commercializing results. The next section describes university-industry partnerships and emerging models.

Models of University-Industry Research Partnerships

In this section of the literature review I look at some of the current changes in university-industry research partnerships and some of the models that currently exist. University-industry research partnerships of the past often began as a series of ad-hoc efforts by individual companies, faculty, staff or students. University-industry research partnerships have evolved into a more sophisticated set of strategies undertaken alongside government funding, rules and regulations (Trani & Holsworth, 2010). University-industry research partnerships have taken many forms and there have been a range of names and shifting classifications that have described these types of partnerships. These research partnerships have often been referred to as applied research, contracted, sponsored or joint research. What they all have had in common is that they have allowed companies and universities access to specialized research facilities and personnel. This type of research happened either on campus, inside incubating research parks, at a company, or at university based interdisciplinary research centres.

A recent example of university-industry partnership model that has unfolded over the last five years is the federally funded Network Centres of Excellence (NCE) program. This program has supported thirty-four research and commercialization centres and projects at twenty-five universities across Canada, with more than sixty industry, government and non-profit organizations (GRAND, 2012). NCEs have been touted as situations where pure, curiosity, and applied research have worked alongside each other in multi-sectoral and inter-sectoral projects. The goal of the NCEs was to "transform multidiscipline research into user-centred solutions" (GRAND, 2012). Historically universities were wary of partnering with other universities, which were often seen as their competitors. However, there have also been recent changes, which McGill University described as "the tendency for traditionally competing universities is now to join forces or develop public-private partnerships giving themselves competitive advantages" (2011, p. 1). The NCE model has provided a contemporary example of how university-industry research partnerships have evolved.

Another area of change in university-industry research partnerships has been the shifting of the traditional demarcation lines between industry research and university curriculum. In the past university-industry research partnerships tended to be separate from curriculum. These types of research partnerships no longer work in isolation from the university curriculum. More recently, many examples have demonstrated that curriculum is no longer exempt from partnered research. University-industry research has become embedded into certificate, undergraduate and graduate programs. Discussing Penn State's certificate program in professional development, Trani and Holsworth (2010) described how: "It enables local companies to draw upon the national and global expertise of Penn State faculty in bringing a fresh perspective to their challenges with the intent of creating a real-time solution that can be immediately tested" (p. 54). In reference to universities of art and design, Tamburri (2014) described how research has become embedded in curriculum:

> Newly introduced programs combine engineering, business and science with art and design. These include a digital futures program, a masters of inclusive design, and, to launch in 2016, a masters of health design. Another young initiative is an incubator for start-ups that just received almost $1 million from the Ontario Government. The Imagination Catalyst,

as it's known, is a place where companies can come for help solving
research problems. (Tamburri, 2014, p.2)

From Tamburri and others, we can see that the traditional demarcation lines between university-industry research partnerships and curriculum have clearly shifted.

In summary, few would disagree that there has been a strategic move by universities, in all sectors, to expand and formalize their research partnerships with industry. University-industry research partnerships have become more inter-sectoral and inter-university and at the same time have also become embedded in curriculum more than ever before. While university-industry research partnerships have been the norm for many decades in the STEM sectors, formalized research partnerships between universities of art and design and companies have recently become more commonplace, especially their involvement with government funded research and models such as those described earlier. These shifts are discussed further in Chapters Four and Five. Following on from this section I have looked at some of the benefits of university-industry research partnerships and then discussed concerns over university-industry research.

Benefits of University-Industry Research Partnerships to Universities

In this section I have presented some of the benefits associated with university-industry research partnerships *for universities*. Then in the next section I have presented some of the benefits of university-industry research partnerships *for companies*. I have then discussed some of the concerns associated with university-industry research partnerships from both universities and companies. In looking solely at the benefits of university-industry research partnerships for the university, literature has shown that they have impacted a university in numerous ways. In this section I discuss some of the foremost ways.

Providing a useful summary, the Canadian Association of Research Administrators recently described the main reasons that academic institutions carry out research. It stated institutions carry out research to: advance excellence, benefit people, collaborate, promote the adoption of best practices, create new knowledge, and to bring

evidence into practice through translation and application (Porter, 2014). This list was helpful because it provided a backdrop for understanding the support for university research.

Universities have been described as well situated to develop professional networks that bring together public and private sector stakeholders. And, there has been general agreement that good relationships are paramount in university-industry research partnerships, specifically relationships between university staff and their contacts in SMEs (Temple, 2012). Trani and Holsworth explained the university's situation in more detail:

> Universities and colleges can be relatively adept at bringing people together across traditional boundaries and ostensibly eccentric arrangements to collaborate on projects that create new lines of work, inquiry and products. It is far easier to bring biomedical engineers and artists together…in a university than in many private-sector organizations. (2010, p. 29)

Trani and Holsworth's statement suggested that universities have had the capacity to bring together interdisciplinary and inter-sectoral researchers in ways that companies or other types of public and private sector entities may not.

Historically, there have been concerns that university graduates have been less employable than their counterparts in colleges and polytechnics. Browne (as cited in Williams, 2012) suggested, "There is a wide consensus that the current system needs substantial reform" (p. 26) and he went on to say that there needs to be a closer fit between what is taught in higher education and the skills needed in the economy. In following the belief that university-industry is generally a good thing, university-industry research partnerships have been viewed as a way to prepare students and graduates for industry and match companies with qualified talent. These partnerships have been recognized as a pipeline for this talent acquisition. Trani and Holsworth also stated that there had been an increase in the number of companies who wanted to "employ our students and utilize the intellectual capital of our faculties" (2010, p. 3). Government grants for university-industry research have often been built on employing students as research assistants. This has allowed students to understand the relevance of their education, and gain mentorship and employment opportunities (Klawe & Whitney, 2003).

This has been timely, as universities have produced more PhDs than ever, many of whom have looked towards the private sector for employment. Klawe and Whitney's work reinforced that claim, "It is more likely that new PhDs will work for small companies" (2003, p.173). Munroe-Blum puts this return on investment as, "…collaborative research also leads to excellent job opportunities for graduating students" (2012, p. 2).

Presenting the opposite perspective, critics have suggested that involvement with industry has distorted a student's education in favour of commercial interests. Along the same lines, it has been asked whether it is a university's role to provide education that leads to job opportunities. Universities have quite often been under multiple pressures from business and government to develop research capacity as well as under political pressure to contribute to economic development (Bowie, 1994). The changing role of the university in society has been on the minds of many (Klawe & Whitney, 2003; Munroe-Blum, 2012; Temple, 2012). In summary, while contentious with some, university-industry partnered research has offered universities, their faculty and students opportunities to interact, in various capacities, with companies. For those who feel that the university model needed to further align itself with industry and the private sector, university-industry research partnerships have offered one such vehicle.

In addition to the benefits to universities, there have also been benefits to companies that have engaged in university-industry research partnerships and these are discussed in the next section.

Benefits of University-Industry Research Partnerships to Companies (SMEs)

There are companies that have chosen to partner with universities, and companies that have chosen to not go that route. In looking solely at the benefits of university-industry partnerships to companies that have partnered with universities, literature has indicated that they are impacted in several ways. In this section I will present the most foremost ways.

First, it has been reported that university-industry partnerships have been designed to increase R&D efforts and have offered businesses the opportunity to acquire new knowledge and expertise. This, in turn, can lead to increased results from R&D in the form of innovation, intellectual property (IP), licensing and patents. R&D efforts in Canada have been reported as being low. Three major national and international bodies, NSERC (2013), the International Organization for Economic Co-operation and Development (OECD, 2010) and the World Economic Forum (2014), have reported that we are currently in an era where the level of research and development (R&D) in Canada has been relatively low. The 2013-2014 World Economic Forum, *Global Competitiveness Report* (Klaus & Schwab, 2014) indicated that Canada has dropped in a number of world rankings, namely three: university-industry research partnerships, company research and development (R&D) and innovation.

There have been calls for companies to increase their R&D. The majority of private sector R&D has been concentrated in a small number of very large companies (NSERC, 2009). Many highly innovative companies have not engaged in research at all (OECD, 2010). The World Economic Forum stated: "Canada's competitiveness would be further enhanced by improvements in its innovation ecosystem, such as increased company-level spending on R&D and government procurement of advanced research products" (2013, p. 4). Consistently university-industry research partnerships have been touted as a way to boost Canada's lagging rate of innovation.

Generally, the term innovation has a high profile political platform. The Conference Board of Canada has listed tangible measures such as trademarks, patents and public and private sector R&D spending levels as innovation indicators (2014). Both the Canadian Minister of State for Science and Technology and the Prime Minister had "repeatedly lamented that Canadian businesses are spending less now on R&D than they were before the 2008-09 recession, in spite of a generous tax incentive scheme" (Bradshaw, 2012, p. 2). In response to claims from the OECD and others, the Canadian government has supported university-industry partnerships with funding in the hope that they produce more innovation in small businesses.

Supporting university-industry research partnerships, the OECD claimed that innovation has rarely occurred in isolation. The OECD described innovation as: "…a highly interactive process of collaboration across a growing and diverse network of stakeholders, institutions and users" (2010, p. 2). As the "complexity and costs" of engaging in research have increased, so has collaboration (OECD, 2010, p. 6). Along the same lines as the OECD, NSERC stated that Canadian companies collaborated substantially less than their international peers (2009). Providing universities and companies with funding and opportunities to work collaboratively, the government of Canada has hoped to boost in innovation.

There have also been a number of other possible benefits for companies that partner with universities. It has been reported that research partnerships between universities and companies have provided opportunities for companies to work collaboratively. Through this collaboration, they have accessed new talent in the form of university students, graduates and faculty, and created short-term and long-term employment opportunities (Tamburri, 2014).

In addition to improving innovation through R&D and the employment of students and graduates, Bowie (1994) listed more benefits, such as:

> Receiving employee training at the university; gaining lead-time by getting a first look at research; getting the right to first refusal for an exclusive license; gaining access to certain technology that may be difficult to come by; accessing special university facilities that would be too expensive for the corporation; obtaining inexpensive physical space in a university-business research park for small entrepreneurial companies. (p. 94)

In addition to Bowie's list, the OECD suggested that, through partnerships with universities, companies are seeking to stay on top of developments in their field, have the opportunity to expand their market reach and get new goods to market ahead of their competitors (OECD, 2010). Lastly in support of university-industry benefits, Temple (2012) proposed that bringing together the university's research knowledge, reputation and support with an SME's production expertise can reduce the difficulties often experienced by start-ups and SMEs in finding and securing government and non-governmental funding.

There was considerable literature on the benefits of university-industry research partnerships. While university-industry research partnerships have been heralded as having the potential to add to a company's innovation rate, and provide a pipeline for talent hiring, we must not forget that many companies have chosen not to engage with universities. The reasons for their non-engagement are equally as important to this study, and some of these reasons are presented in the next section.

Critics of University-Industry Research Partnerships

It is important to examine the concerns that have been expressed about university-industry research partnerships. To do this I have concentrated on four main areas that were re-occurring in the review of literature. First I looked at concerns voiced over the generation and ownership of intellectual property within, or as a result, of university-industry research. Second I looked at claims that university-industry research has subsidized the private sector. Third I looked at whether university-industry research has had independence of thought when its presence may have impacted the climate for pure, basic and curiosity driven research. Then, lastly I looked at the differences in cultures between universities and companies that have been noted as impacting university-industry research partnerships. In addressing these four areas it is hoped that this literature review provides a better understanding of the climate for university-industry research partnerships. By looking at some of the reasons that companies and universities have chosen to not take part in research partnerships, it is hoped that a more balanced view of university-industry research partnerships will be provided.

Intellectual Property

Often the desired results of university-industry research partnerships have been in the form of intellectual property (IP), a license, patent or other revenue producing entities. In the 1980s, when university-industry research partnerships were gaining a strong foothold in the STEM sectors, critics raised concerns around ownership of IP and patents (Bowie, 1994). As ideas and intellectual property passed back and forth between universities and companies, there were many questions concerning ownership of IP and revenues from patents and licensing agreements. As a result, it became commonplace

to have IP lawyers and contracts attached to university-industry research partnerships. Research funded by the government, universities and the private sector has had policies that have encouraged the distribution of these types of returns on investments.

Universities and companies had hoped to become the financial benefactors of their partnered research. Originally thought of as a strong revenue producer, studies have shown that claims regarding income from university-industry patents and licensing have been over exaggerated and, moreover, that the distribution of patents have been skewed (Martin & Etzkowitz; Owen-Smith, Powell & Snellman as cited in Williams, 2012). While acknowledging that there has been a growth in university patents, there were "few institutions such as MIT that receives as much as one quarter of their research funding from industry" (Martin & Etzkowitz, as cited in Williams, 2012, p. 31). This was also echoed in Temple's (2012) research which propositions that most universities have not generated much income from new inventions. However, he went on to say that for a few universities, the income may have been considerable (2012). This is also echoed in the University of British Columbia's (UBC) Strategic Research Plan:

> In academia there has been a longstanding fascination with the use of intellectual property (IP) to pursue financial, economic and societal gains. IP protection and commercial exploitation have often conflicted with traditional academic values of free and open dissemination. While many university technology transfer offices have achieved commendable results, closer examination of their portfolios shows that only 1 in 1000 technologies could be categorized as a blockbuster success, and only 2% of inventions account for 99% of revenue. (UBC, 2012, p. 22)

This statement from UBC's strategic plan supports the view that, while initially heralded as a revenue producer, few universities have benefitted significantly from the IP revenues generated from university-industry research partnerships. Within the review of literature, it was not clear if companies benefited more often from IP revenues than universities. However, critics had also raised concern that research funded by the government, which has benefited the private sector, has in many ways subsidized the private sector. The next section discussed these claims in more detail.

Subsidizing the Private Sector?

There have been claims that university-industry research is a drain on universities and taxpayers. It has been suggested that research partnerships between universities and industry have run the risk of burdening university administration, diverting faculty and drawing graduate students away from their scholastic endeavours into profit making ventures (Bok, as cited in Bowie, 2004). Along the same lines, Heather Munroe-Blum, who was the Principal and Vice Chancellor at McGill University, stated:

> Ottawa's important investments in university research have also, ironically, created a significant burden of unfunded costs for Canada's most research-intensive universities. Each research dollar brings with it 50 to 70 cents of indirect costs: commercialization services, utilities, information technology and regulatory reviews, to name but a few. This creates a painful paradox. Every time a university wins federal research grants, funds must be diverted away from teaching or other core areas to cover these unfunded costs. (2012, p. 2)

According to Munroe-Blum, Bok and others, there is a long way to go before the financial burden of research is not perceived as a drain on university resources.

Government funding for university-industry partnerships has also been described as a drain on taxpayer's resources. For example, Bowie (1994) stated, "Remember that the taxpayers are paying for some of this research. In effect, university-business partnerships are a subsidy for business" (p.100). Bowie went on to recommend that, "Business would benefit from increasing its research expenditure for in-house research" (1994, p.100). Without doubt, there have been concerns that university-industry research partnerships, supported by public funds, have been used to subsidize private gain. Critics have also questioned whether university research funded by the government and private sector has had the power to be fully independent from its funders. This is an important issue, which is discussed in more detail in the next section.

Independence of Thought and Curiosity Driven Research

Critics have voiced concerns over the independence of results and outputs from government and industry-funded research. It has been suggested that, as universities have become more dependent on external funding for support, there has been pressure

"both implicit and explicit – to abandon or at least de-emphasize the university's role as conscience of the broader society and to mute potential criticisms" (Trani & Holsworth, 2010, p. 19). Trani and Holdsworth went on to say that the university had, "traded its autonomy and lowered its voice for the financial support it may receive for its scientific research from the government and for the partnerships with corporations that may not have the public interest at heart" (2010, p. 19). Claims such as these have supported the idea that we are in an era where the universities' role in acting as a conscience to the broader society has changed, and some have suggested that this is to adhere to a more commercial agenda.

Addressing concerns surrounding the adoption of a commercial agenda by universities, James Turk, who was executive director of the Canadian Association of University Teachers, made some important comments. Referring to the 2012 Canadian budget, Turk stated:

> With this budget, the government turns away from the kind of research that leads to new discoveries in favour of a narrow and short-term commercial agenda. By linking research only to business interests the government will stifle rather than promote growth and scientific advancement. (as cited in Charbonneau, 2012, p. 2)

Turk and others have questioned the ability of university-industry research to be curiosity driven. Concerned about the amount of university-industry research Bowie stated, "Such an atmosphere undermines the university's commitment to basic research and that applied research will come to dominate" (1994, p. 83). Concerned with the economic benefits of university-industry research, Bowie proposed that foreign competitors might have benefitted as much as the U.S firms. Research for the public good, Bowie said, was in danger of being neglected and he did not see university-industry research partnerships as a win-win situation (Bowie, 1994).

Klawe and Whitney (2003) also voiced concern over what they called "the potential threats posed by industrial funding of academic research [including] the loss of independence in the form of outside influence over the direction of the work and the diminishment of pure, fundamental research" (p. 183). Turk (2015) more recently echoed

these comments stating that, under current government policy, "once again basic research will be marginalized" (p. 8).

With all of the concerns over university-industry research, Klawe and Whitney (2003) made some recommendations. They suggested that the burden of balance should fall on university administration to address the balance of curiosity and industry funded research. Likewise, Temple (2012) suggested that, when the university has been involved in a myriad of relationships with organizations that are commercially and politically powerful, university governance needed to be designed to safeguard that independence. According to Klawe, Whitney and Temple, the onus falls on university administration and governance and its ability to safeguard curiosity driven research. The points addressed in this section have provided a context for why some universities, university departments and companies have chosen not to partner in research.

This section of the literature review has presented some important concerns regarding university-industry research partnerships. The cultural differences between the two sectors may have also contributed to a company's willingness to partner, or not, with a university, or vice versa. Some of the principal differences in organizational culture will be discussed in the next section.

The Differences in Organizational Cultures Between Universities and Companies

Many would agree that a "cultural gap" has existed between universities and companies (NSERC, 2009, p. 10). This cultural gap between universities and companies begins with a significant disparity in objectives. The private sector has needed to maximize profit and protect research results, while universities have sought to create new knowledge and disseminate it broadly (NSERC, 2012). This difference in objectives has created a myriad of cultural differences between the public and private sectors. Because the public and private sectors have different objectives, they have attracted people with different viewpoints and personalities. Burke explained this as academics searching for "the truth through the discovery and dissemination of general principles,"

whereas business focused on "profit gained through developing and selling products and services" (as cited in Bowie, 1994, p. 77).

The literature on university-industry research partnerships also presented noteworthy procedural differences between universities and companies. These have centred on the validation process for university research compared to the validation process for industry-based research (Wade, as cited in Bowie, 1994). The university has had a complex system of validation, which has centered on a committee of academic review, peer reviews and journal referees. In contrast, "validation in industry is performed in the marketplace" (Bowie, 1994, p. 85). This difference in validation procedures had affected timelines. NSERC described the differences in timing of research results as the different ways of getting things done: companies were driven by economic pressure to deliver measurable innovation results on time scales of weeks, whereas universities offer environments that explored and shared ideas on a time scale measured in years (2009, p.10). NSERC's quote reinforced the idea that procedural and cultural differences exist between universities and companies.

Despite the differences in cultures outlined in this section there have also been many claims that the university community has adopted the attitudes and values of business, "at the expense of the attitudes and values of the academy" (Bowie, 1994, p. 78). This has been more widely referred to as academic capitalism, or as Zornes (2012) and others described it, the neoliberal corporatization of universities.

In summary, the literature in this section supported that there were differences in the culture and practices of universities and companies. These were differences such as objectives, validation procedures and timelines. Some of these differences may have acted as either challenges or opportunities for universities and companies that have considered partnering. These, and other challenges and opportunities, will be discussed further in Chapters Four and Five.

Theories

Two theoretical models were chosen to help inform this study. The theories were: first, Resource Dependency Theory (RDT) which was chosen for this study because it spoke to the way in which universities have become increasingly dependent on their external funders and display market-like behaviours. Second, Institutional Theory, which was chosen for this study because it spoke to the internal norms and cultures of organizations, in this case, universities, companies and government funding agencies. While it was useful to look at these theories individually, it must also be noted that they also related to each other with varying levels of interdependence.

Resource Dependency Theory

Resource Dependency Theory (RDT) came to the forefront in 1978 through the work of Pfeffer and Salanick. RDT acknowledged the influence of external resources on institutions such as universities. Pfeffer and Salanick (2003) asserted that an institution's survival was dependent on its ability to acquire and maintain resources. This supported the notion that no organization was completely self-contained. Resource Dependency theory also recognized that power, influence and an institution's dependency on resources were strongly linked. Describing this linkage in more detail, Jaeger and Thornton (2005) stated,

> Organizations depend on resources, and hence on the environment, for survival. Outside agencies are able to exert some degree of influence over an organization when they control scarce resources that the organization cannot obtain elsewhere. Significant organizational action goes toward negotiations to ensure continued accessibility of needed resources. (p. 54)

They furthered this argument in stating: "As an organization attempts to gain more control over the activities of outside agencies that can supply needed resources, it must surrender some of its own autonomy in exchange" (Jaeger & Thornton, 2005, p. 55). In describing how external resources have also impacted power within organizations, Jaeger and Thornton went on to say that those members of an organization who require resources will attempt to control and influence the organization and furthermore, that power within an organization comes with the attainment of critical and scarce resources

(2005). This suggested that those entities within the university (departments, faculties, research groups, etc.) that were the most successful in obtaining those resources, will exert greater power over larger institutional directions, priorities, etc. to the disadvantage (at least potentially) of those units that are less successful, or that have less potential to attract external funding and resources. Explaining this statement further, Jaeger and Thornton contended that university faculty has exhibited "market like" behaviours to secure external funds for their research (2005, p. 55).

This market-like behaviour in a university has also been referred to as academic capitalism. Slaughter and Rhodes (as cited in Jaeger & Thornton, 2005) proposed that academic capitalism had moved beyond research into teaching, and asserted that within a university, capitalist motivations have replaced the public good. With so many of a university's key dependencies being external, many have rightly questioned the notions of its autonomy and independence. Resource Dependency Theory may therefore offer a useful lens through which to explain some of the data collected within this study.

Institutional Theory

DiMaggio and Powell first identified Institutional Theory in 1983. Whereas Resource Dependency Theory was rooted in external forces, institutional theory described how institutions and organizations have been impacted by their internal cultures and norms. DiMaggio and Powell's work recognized universities as being important centres for the "development of organizational norms" (1983, p. 152). Scott (2004) also provided an understanding of those internal forces and institutional theory:

> Institutional theory attends to the deeper and more resilient aspects of social structure. It considers the processes by which structures, including schemas, rules, norms, and routines, become established as authoritative guidelines for social behaviour. It inquires into how these elements are created, diffused, adopted, and adapted over space and time; and how they fall into decline and disuse. (p. 2)

Institutional Theory, then, recognized that organizations develop their own cultures, made up of institutional norms and ways of doing things. Scott's research investigated the internal make-up of organizations and institutions. He went on to describe the various models in organizations that are based on "rationalized myths" that have been

"promulgated by individuals or groups" (Scott 1983, as cited in Scott, 2004, p. 6). Statements such as Scott's make it easy to grasp how practices such as university-industry research partnerships have become increasingly normalized within institutions. Especially, as literature has suggested, that there is a one hundred year history of university-industry research partnerships in the STEM sectors.

Institutional Theory was also useful because it provided a reminder that, within this study, there are three distinctive cultures at play: the university, the corporate or commercial, and government (or particular government agencies or departments, which exist themselves within a political culture). However, as Scott (2004) suggested, in order to survive, organizations must conform to the rules and belief systems prevailing in their environment. Institutional theory will provide a theoretical lens in which to view these different cultures and their impacts on university-industry research partnerships.

Resource Dependency Theory and Institutional Theory were closely linked. DiMaggio and Powell (1983) hypothesized that, "The greater dependence of an organization on another organization, the more similar it will become to that organization, in structure, climate and behavioural focus" (p. 154). DiMaggio and Powell also suggested that, over time, organizations become "isomorphic" with their environments. They argued that institutions that depend on each other become more alike. Over time, said DiMaggio and Powell (1983), all organizations become identical. The assertions by Scott, DiMaggio, Powell and others in describing Institutional Theory helped frame, explain and interpret some of the data collected in this study.

In this section we have looked at two theories that were relevant to this study, Resource Dependency and Institutional Theory. They helped to frame, inform, explain and interpret the data findings. I have also expanded on these theories and their relevance in Chapters Four and Five.

Summary of Literature Review

This literature review has shown that, while there was considerable literature on university-industry research partnerships in the STEM sectors and a small amount on

the social sciences and humanities, there was little if any literature that focused on research partnerships between universities of art and design and companies in the creative sector. The lack of literature focused on research partnerships between universities of art and design and companies supported the idea that these types of research partnerships were comparatively new and as such less was known about this practice.

There was considerable literature on the rise of the knowledge economy and knowledge worker and the shifting focus of universities to meet this rise. This was relevant to this study as universities of art and design and companies, under the umbrella of the creative sector, are increasingly seen as contributors to the knowledge economy. This led to the themes of academic capitalism and the influence of the private sector on universities and vice versa. Literature pointed to the fact that universities are clearly more engaged and more entrepreneurial than ever before. Much of the literature reviewed in this section supported the belief that universities exist in an increasingly marketised environment.

In reviewing the literature on university-industry research partnerships, it was evident that government policies and funding have had some influence on the participation of companies and universities involved in partnered research. World ranking reports (World Economic Forum, 2015) also supported that innovation in Canada was lagging, and that university-industry research partnerships had been identified as a vehicle to increase innovation. On the quest to improve innovation through university-industry research, government funding had supported a range of different types of university-industry research partnership models, and this had evolved into inter-sectoral, inter-university and interdisciplinary models. Literature also supported that university-industry research had gone far beyond being on the margins, becoming embedded in university curriculum.

The literature also pointed out key criticisms that had been voiced about university-industry research partnerships. The ones discussed in this review focused on the diminishing ownership and revenue from IP, the impact of university-industry

research on curiosity-driven and pure research, the subsidizing of private sector research by governments and universities and the drain on university resources.

This literature review also offered an outline of some of the prevailing differences in organizational cultures between universities and companies. It described the differences in objectives and procedures and described how those disparities had evolved into a significant difference in timelines between universities and companies. Those differences will be revisited in the data analysis chapter within this study.

The last section in this literature review described the two theoretical lenses used in this study. They were Resource Dependency Theory and Institutional Theory. Providing juxtaposition of theory and practice, these theories helped interpret and better understand the data generated in this study and this will be demonstrated in subsequent chapters.

Having reviewed the literature, it seems that, on the one hand we have been in an era that has supported university-industry research partnerships and, on the other hand, challenged this type of research. At a time when universities of art and design and companies within the creative sector are navigating the new economic and political realities of partnered research, it has become important to increase our knowledge and understanding of these partnerships. At best, university-industry research partnerships have protected and unleashed intellectual property and enabled innovation, knowledge transfer and knowledge exchange. At their worst, these partnerships have possibly undermined pure and curiosity driven research and diverted valuable university resources. Being new to partnered research, universities of art and design and companies in the creative sector have the opportunity to learn from historical oversights made by the STEM sectors.

Chapter 3.

Methodology

Introduction

In this chapter I describe the research methodology that was used in this study. The chapter begins with a rationale for the choice of the research tradition (qualitative) and then describes the genre (phenomenology). I also explain how I collected, coded and analyzed the data in the study.

Purpose of the Study and the Gap in Research

This study examined research partnerships between universities of art and design and companies involved in Canada's creative sector. Motivating the study was the recognition of a shortage of literature on research partnerships between universities of art and design and SMEs/companies. Therefore, little was known about the challenges and opportunities of these partnerships or whether they were sustainable models of innovation. Companies that had worked with, engaged with, and formed research partnerships with universities of art and design had become much more commonplace throughout the last decade. In the course of fifteen interviews, I heard the opinions of researchers, practitioners, academics, company directors and government funders. The participants characterized the public, private and education sectors and focused on their experiences of these types of research partnerships. This study provides an analysis of research partnerships between universities of art and design and companies and fills a void in contemporary literature.

In the past, many studies focused on research partnerships between universities and companies in the STEM sectors. However, I discovered that little or no literature

focused on research partnerships between universities of art and design and companies in the creative sector.

Importance of Research

More broadly this study will be useful to research directors and research practitioners in the public and private sectors who have contemplated university-industry research partnerships, as well as those who have already engaged in university-industry research partnerships both in the creative sector and beyond. The study is useful in that it identifies and analyzes the factors that have supported and hindered university-industry research partnerships. It may also be useful to policy developers and policy makers in government, universities, colleges, research funding agencies and the small business sector. In addition to laying out the factors that have supported and hindered university-industry research partnerships, it provides an understanding of the benchmarks for success and describes factors that support sustainable models for innovation within university-industry research. Lastly, the study may also be of interest to the general public as it offers an opportunity to have a conversation about the role of universities in the wider society and consider the prevalence of public and private partnerships.

The next section of this chapter describes the rationale behind the choice of the research tradition (qualitative research methods) and the genre (phenomenology).

Methodology: Qualitative Phenomenological Research

Qualitative Research

Qualitative research has been described as most useful when a problem or issue needs to be explored (Creswell, 2011). I began this doctoral research by thinking backwards, and considered my past experience with universities and the private sector. Specifically I reflected on the research partnerships that I had been involved in between universities and companies. The most prominent changes that I encountered within

universities were related to a significant rise in private sector involvement on university campuses. For example, I considered the university-industry research partnerships, their funding models and the ways in which they had impacted, first universities, and second companies. As I reflected, I became more aware of the many unanswered questions surrounding public-private partnerships in general, and in my case, university-industry research partnerships. For example, I wanted to know more about their opportunities and challenges and find out whether they had been sustainable models for innovation. These questions began to align themselves with qualitative research methods. I hypothesized that the answers to these questions were likely to be found with the people who had taken an active part in university-industry research. According to Denzin and Lincoln (2011), qualitative researchers have a history of studying or interpreting things in their natural settings (as cited in Creswell, 2012). In the tradition of qualitative research, this study provided me with the opportunity to dig deeper and reflect on my past experience with university-industry research.

Qualitative researchers have a long history of using instruments such as open-ended questions (Creswell, 2011). The data collected from these open-ended questions have been typically reviewed, interpreted and made sense of by organizing it into themes though the use of inductive and deductive logic (Creswell, 2011). Using these data, qualitative researchers have built "patterns, categories and themes from the bottom-up" (Creswell, 2011, p. 45), and, true to qualitative research, this was how data were collected and handled within this study.

Phenomenology

This study was suited to a phenomenological approach as it reports and interprets the experiences of a range of study participants, in this case from the public, private and governmental sectors. It has been suggested that researchers first turn to a phenomenon when an "abiding concern" seriously interests them (van Manen 1990, as cited in Creswell, 2007). Creswell described this as,

> The type of problem best suited for this form of research is one in which it is important to understand several individuals' common or shared experiences of a phenomenon. It would be important to understand these common experiences in order to develop practices or policies, or to

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develop a deeper understanding about the features of the phenomenon. (Creswell, 2007, p. 60)

The two main branches of descriptive and interpretive phenomenology have become common philosophical approaches in qualitative research. Edmund Husserl (1900/1970) is widely acknowledged as the father of phenomenology in the twentieth century. One of the defining features of his work on phenomenology was to define the essence; Husserl distinguished between conscious knowledge and the phenomena at which the consciousness is directed (Laverty, 2003). Husserl stressed intentionality and advocated that human experience is the source of knowledge (1900/1970). Martin Heidegger (1927/1962), who was Husserl's student, built new concepts into phenomenology, which came from philosophers in diverse areas such as psychology, sociology, and education. Heidegger believed that humans are influenced by their lifeworld and he acknowledged that both the researcher and the participants bring their perspectives to an understanding of the phenomena (1927/1962). While Husserl's phenomenological philosophy was intended as a descriptive practice, Heidegger argued that the phenomenological approach was interpretive. Both Husserl and Heidegger's descriptive and interpretative models provided a foundation for this study.

Moustakas (1994) presented a more psychological transcendental phenomenology, which drew upon the work of Giorgi (1985), Van Kaam (1966) and Colaizzi (1978). Transcendental phenomenology or descriptive phenomenology suggests that there are features of lived experience that are common to all persons who have that experience and that those experiences are consciously expressed. The transcendental phenomenology procedures described by Moustakas consisted of identifying a phenomenon to study, bracketing-out one's experiences, and collecting data from several persons who had experienced the phenomenon (1994). "One's experience" in this case is that of the researcher. Bracketing requires on-going interrogation of one's own biases and interpretations in order to appreciate (not necessarily to eliminate) their influence in the process of pattern seeking. Moustakas (1994) psychological and transcendental phenomenology introduced the idea of bracketing into the preparation stage of this study and it prompted me to not only recognize, but also try to put aside my assumptions on the topic. Nonetheless, and as described further in this section, bracketing is subjective, and not always possible.

Leading on from both Husserl and Heidegger, van Manen (1990) described hermeneutic phenomenology as attentive to both descriptive (phenomenological) and interpretive (hermeneutic) methodology because it claims that there are no such things as uninterpreted phenomena. "The implied contradiction may be resolved if one acknowledges that the (phenomenological) 'facts' of lived experience are always already meaningfully (hermeneutically) experienced. Moreover, even the facts' of lived experience need to be captured in language (the human science text) and this is inevitably an interpretive process" (van Manen 1990, p.180.) Recognizing the work of van Manen, Moustakas, Husserl and Heidegger, this study employed bracketing (albeit limited), descriptive and interpretive phenomenology.

Phenomenologists have in the past collected data from those who have experienced the phenomenon, and then have developed a composite description and interpretation of the essence of the experience for the individuals. Phenomenology is different from a narrative study in that a narrative study reports the life of a single individual, multiple stories, or the stories of multiple individuals, whereas a phenomenological study describes the meanings assigned to a concept or phenomenon by several individuals (Creswell, 2007). Phenomenological inquiry seeks out the "novel features of familiar situations" (Giorgi & Giorgi, 2003, p. 249). One of the primary goals of this study was to better understand the experiences of the fifteen study participants that belong to three particular groups (universities, companies and government funders) and, as such, a primarily interpretive phenomenological approach was adopted.

Within this study, I was both a scholar and practitioner, and as such I brought a range of experiences, assumptions and beliefs developed before, during and after the study was conducted. In interpretive phenomenology, bracketing has a different meaning. Interpretative phenomenology supports the idea that it is impossible for researchers to put aside their previous experience, as this experience and knowledge is central to how they know the world (van Manen, 1997). Therefore, while I tried to bracket-out my experience, I also reflected on the implicit knowledge and assumptions that I inevitably brought to the study and consciously determined how and in what way my personal experience would be introduced.

On the one hand, I tried to bracket-out my experience and on the other hand, I acknowledged that my assumptions and knowledge would undoubtedly impact and guide the study. My experiences with interpretative and descriptive phenomenology were documented with a field journal and on-going reflexive short essays. It is therefore hoped that the focus of the study is on the essence of the participant's experience, rather than mine. Nonetheless, it is recognized that the description of phenomena without interpretation is impossible (van Manen, 1997). As a qualitative approach to research, interpretive phenomenology places emphasis on the broader philosophical assumptions that are central to the research. Data collection and analysis attempts to move from narrow threads to interpretative, broader themes. In this study, the purpose of phenomenological inquiry is not to solve problems of university-industry research, but to come to a better understanding of the practice of university-industry research.

Data Collection, Research Instruments and Procedures

The two main ways that data were collected in this study were first from an analysis of government, business and university reports and policy documents, then second from fifteen semi-structured interviews with purposively selected study participants.

Interviewing as a Technique

Interviewing is a commonly used tool in qualitative research. Social science researchers who have focused on generating data to examine participants' lived experiences have made frequent use of phenomenological interviews (Raulston 2010). One of the main purposes of the phenomenological interviews that were carried out in this study was "to generate detailed and in-depth descriptions of human experiences" (Raulston, 2010, p. 16), and in particular, the experience of university-industry research partnerships. The phenomenological aspect includes not only descriptions of experience, but also the meanings and interpretations applied to the experiences by the study participants. Interpretative phenomenology supports the idea that it is impossible for researchers to put aside their previous experience, as this experience and knowledge is central to how they know the world (van Manen, 1997).

Semi-structured interview protocols were used in this study, such as, the interviewer initiating questions and posing follow-up probes in response to the interviewee's "descriptions and accounts" (Raulston, 2010, p. 14). The interviewer's role in phenomenological interviews is neutral, interested and pedagogical, and it has been suggested that the interviewer's role be that of a student of the interviewee (Raulston, 2010). This approach provides the interviewer the opportunity to learn as much as possible about the topic. Also in agreement with Raulston (2010), careful listening and sensitive questioning provided the foundation for the interviews that took place within this study. The fifteen semi-structured phenomenological interviews that took place within this study gave voice to those who have been involved in research partnerships between universities and companies.

Interview Questions

To begin the interview, I asked the study participants to think about the university-industry research partnership that they had been involved, as described in Chapter One. Then they were asked the following questions in this sequence:

1. Based on your experience, what do you think the factors are that support the initiation and development of research partnerships between universities of art and design and companies/SMEs?

2. What do you think the factors are that hinder the initiation or development of research partnerships between universities and companies/SMEs in the creative sector?

3. What are the current models of university-industry research partnerships that you are aware of, and to what extent do these models function effectively? Are there elements you might like to change?

4. Can you talk about any political, environmental or economic influences and considerations associated with university-industry research?

5. As a research project between a university and SME progresses, what do you think, generally, are the internal and external elements that contribute to, first, a research project's sustainability; and second, a research project's demise?

6. How would you define success in university-industry research partnerships? What are some of the benchmarks and success indicators you have used, or currently use?

7. Do you think research partnerships between universities and companies are sustainable models for innovation (for example, new products, services, etc.) in universities and companies?

Interview Group Size

Fifteen interviews were carried out within this study. This fell within Polkinghorne's guidelines, which recommend that qualitative researchers interview from five to twenty-five individuals who have all experienced the phenomenon (1989, as cited in Creswell, 2007). The interviews varied in length, the longest being seventy minutes and the shortest being thirty-five minutes. The average length of the interviews was fifty-three minutes. Six of the study participants/interviewees were female and nine were male. Nine of the interviews took place in person at a university, company or government office. Two of the interviews took place using the Skype™ communications software (video). Three of the interviews took place using the telephone and one of the interviewees opted to submit written responses to the interview questions. The interviews that took place in-person, by Skype and by telephone were digitally audio-recorded, transcribed and then coded for themes.

Using purposive sampling design, the fifteen study participants were selected because they fitted into one of the three following groups. They either worked in an SME (a small or medium size company), a publically funded university, or a federal/provincial government research-funding agency. To provide an equal balance of each of the three sectors, public, private and governmental, five study participants were chosen from universities, five from SMEs, and five from government research-funding agencies. True to phenomenological interviewing, the study participants were all selected because they had lived-experiences of university-industry research partnerships. Raulston explained how important this aspect is to a phenomenological study:

> To use phenomenological interviews effectively, it is essential that the interviewer has identified participants who have both experienced, and are able to talk about the particular lived experience under examination. (Raulston, 2010, p. 17)

This type of interviewee selection has also been referred to as key-informant interviews (Creswell, 2012).

University students were not included in this study. Whereas it was noted that their participation in university-industry research partnerships has been very important, and their views would no doubt have been a valuable addition, they would have also significantly expanded the scope of this study.

Interview Set One: Company Participants

To provide an equal balance of each of the three sectors, public, private and governmental, five study participants were chosen from universities, five from SMEs, and five from government funding agencies. The first set of interviews consisted of five company directors/research directors, who worked in small or medium size companies (SMEs). Each of the study participants was interviewed individually; the study participants representing companies/SMEs were interviewed first, before those from universities and then government funders.

The Government of Canada's definition of a SME was adopted for the purposes of this study. A small enterprise has been defined as a company with fewer than one hundred employees and a medium-sized enterprise has been defined as a company with one hundred to four hundred and ninety-nine employees (NSERC, 2012). Companies with five hundred or more employees have been considered large enterprises (NSERC, 2012) and were beyond the scope of this study.

The companies represented in the interviews of this study worked in the fields of product design, digital media, emerging media, soft product design and clean-energy technology design. The SMEs ranged in age from two years to over ten years old. They also ranged in size, from as small as five employees, to as big as four hundred and fifty employees. The largest company interviewed has since moved well beyond the definition of a SME, while the others have grown at a steady rate. To ensure the anonymity of the study participants from Companies/SMEs, their names and that of their companies have not been identified in the study. Within the results chapter, the Study Participants from companies were identified and referred to by their participant number, which is Study Participant C1 to C5 in the text.

Interview Set Two: University Participants

To provide an equal balance of each of the three sectors, public, private and governmental, five study participants were chosen from universities, five from SMEs, and five from government funding agencies. The second set of study participants consisted of five faculty and/or research directors who worked in universities. The universities were:

1. Emily Carr University of Art and Design (formerly known as Emily Carr Institute of Art and Design) in Vancouver, British Columbia (BC);
2. NSCAD University (formerly known as Nova Scotia College of Art and Design) in Halifax, Nova Scotia;
3. OCAD University (formerly known as Ontario College of Art and Design) in Toronto, Ontario;
4. The Centre for Digital Media (a consortium Centre operated by Simon Fraser University, University of British Columbia, British Columbia Institute of Technology and Emily Carr University) in Vancouver, BC; and
5. The University of British Columbia in Vancouver, BC.

To ensure anonymity of the study participants from universities, the names of the universities have been generally identified in this study, but not the names of the participants. The Study Participants from universities were referred to by their participant number, which is described as Study Participants U-1 to U-5 within the text.

Interview Set Three: Government Research-Funding Agency Participants

The third set of study participants in this study consisted of five directors who worked, or had recently worked, in government research-funding agencies. This included provincial and federal government research funding bodies. Some of the participants stated that they represented the views of the funding agency, while others were clear about representing their own views and not those of the funding agency or the government. To protect the anonymity of the study participants, neither their names nor the granting agencies have been identified in the study. The Study Participants from government funding agencies were referred to by their study participant number, which is described as Study Participant F1 to F5 within the text.

Selection and Recruitment of Study Participants

In this study, the selection of all the study participants was built on purposive sampling, and it was not random. One of the values of choosing qualitative phenomenological research was that it was suited to working with participants who have had direct experience of the subject being researched. The participants in this study were selected from the professional network of the researcher. The participants were given a letter of invitation that described the research and a Consent Form. These documents explained what was being asked of them and the limitations around confidentiality, depending on the interview processes used.

All but one of the fifteen study participants was at arm's length from the researcher/interviewer. The participant who was not at arm's length was, at the time of the interview, a colleague of the researcher based at Emily Carr University of Art and Design. The selection, invitations and interviews all followed protocols corresponding to ethics approvals from two research ethics boards at Simon Fraser University, where the researcher was a student, and at Emily Carr University of Art and Design, where the researcher was employed at the time of the study.

Challenges of Qualitative Phenomenological Research

Working in close proximity to the research subject in this study brought both benefits and challenges. Whereas Husserl's phenomenological philosophy (1900/1970), described in the previous section, was intended as a descriptive practice, Heidegger (1927/1962) argued that the phenomenological approach was interpretive. Both Husserl and Heidegger's descriptive and interpretative models provided a foundation for this study. Investigator reflexivity and bracketing, while somewhat contrary to interpretive phenomenology, were nonetheless important in the study. Moustakas (as cited in Creswell, 2007), urged investigators to set aside their experiences as much as possible and take a fresh perspective towards the phenomenon under examination. Creswell described the importance of reflexivity:

> …Qualitative researchers use an emerging qualitative approach to inquiry, the collection of data in a natural setting sensitive to people and places under study; and data analysis that is both inductive and deductive

and establishes patterns or themes. The final written report includes the voices of participants, the reflexivity of the researcher, a complex description and interpretation of the problem, and its contribution to the literature or a call for change. (Creswell, 2011, p. 44)

In keeping with Creswell's recommendation, the language of participants was included as much as possible, particularly in the results section in Chapter Four of the study. Creswell and van Manen (1990, as cited in Creswell, 2007) are clear to state that bracketing personal experiences have presented a difficult challenge for researchers in general.

While I had a curiosity and a commitment to engage reflexively and bracket as much as possible in this study, it was fully understood that the qualitative methods used produced information only on the particular cases studied. As a result, conclusions were presented as propositions rather than facts.

Process for Data Analysis

Analysis of Government Reports, Policy Documents and Other Texts.

The research for this study undertook an examination of government and business reports and policy documents, University Strategic Research Plans and Tri-council reports. Government reports and policy documents provided useful contemporary and historical data. They were used to develop an understanding of local, national and international government policies and research funding patterns and provided a wider examination of the overall context of university-industry partnerships. University Strategic Research Plans, archival and current, provided information on the evolution of research within the particular universities included in this study and beyond, and provided an insight into their commitment to university-industry research partnerships, and other types of research, particularly over the last two decades. Reports from the Government research-funding agencies were useful in providing data on the expansion and contraction of government funding for research activities, particularly those research activities that included universities and companies. Tri-council, government funder reports also provided statistics on government funding patterns and presented data on the size and scope of past and present university-

industry research funding. Annual reports from the World Economic Forum and the Conference Board of Canada provided an international comparison and context for performance data and indicators with reference to Canada's and other countries' innovation.

Process for Interview Data Analysis

There are many different processes for coding, often called data analysis in qualitative research. This section discusses the processes used in the interpretation of the interview data in this study. Coding has been described as the "critical link between data collection and their explanation of meaning" (Charmaz, 2001, cited in Saldana, 2013, p. 3). A code in this type of qualitative study is most often a word or a short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute within an interview transcript (Saldana, 2013). Coding is not a precise science. Saldana (2013) described it as an interpretive act. As an interpretive act, it is also tied to the study investigator's ability to engage in bracketing and reflexivity.

The data interpretation, or coding process, in this study went through three main stages. The first was open coding, which provided a procedure for developing categories of information built around the most repeated codes. The second stage was axial coding which provided a procedure for interconnecting the categories. And, the third was selective coding, which provided a procedure for building the story that connected the categories, producing a set of theoretical propositions (Gibb, 2007).

The data interpretation began by using an open coding process. Saldana (2013) called this First Cycle Coding. I did three close readings of each transcript, which allowed me to gain an understanding of the interviews and to highlight key words and phrases for each question. I recorded these on an open coding chart. In the beginning I kept the three groups (universities, companies and government funders) in separate charts. Throughout the initial readings, I compared the responses of the three groups for commonalities and differences. After identifying the most repeated codes, I established makeshift categories, which then became themes. With each new transcription in each of the three groups, I fixed or changed the themes. I also built sub-themes, added categories and deleted old ones. I started to see the consistent repetition of codes and

the themes that emerged. I was able to see patterns of the repetition across the three distinctive groups.

After the initial open coding process, I started axial coding. This was similar to what Saldana (2013) referred to as Second Cycle Coding. Axial coding was useful because it provided a procedure for interconnecting the themes and categories. Key themes that had appeared consistently in the transcriptions were disaggregated. Then I used selective coding, which allowed me to start building the story that connected the categories, producing a set of theoretical propositions that related to each question and my original objectives.

Reflexivity

Within this study, I was both a scholar and practitioner, and as such I brought a range of experiences, assumptions and beliefs. Both Husserl and Heidegger's descriptive and interpretative models provided a foundation for this study. While Husserl's phenomenological philosophy (1900/1970) was intended as a descriptive practice, Heidegger (1927/1962) argued that the phenomenological approach was interpretive. It was my hope that, by describing my experiences with the phenomenon and then bracketing my views before proceeding, I represented the experiences of the study participants and focused on what has been described as the essence of their experience. However, I also reflected on the implicit knowledge and assumptions that I inevitably brought to the study and consciously determined how and in what way my personal experience would be introduced.

Testing Reliability/Validity and Believability

Within this study, it was fully understood that the qualitative methods used produced information only on the particular cases studied. As a result, any conclusions have been presented as propositions and emergent questions. For the purpose of providing 'member checks', which checked the validity and interpretation of the results, nine of the fifteen study participants were sent the results tables from Chapter Four. Nine study participants were selected because this reflected three study participants (more than half) from each group. These participants were asked if the themes accurately reflected our interview conversations. All nine of the study participants responded to my

request. All of their responses confirmed that the themes accurately reflected our conversations within the interviews. In addition to the member checks, in November 2014 Dr. David Kaufman, Senior Supervisor for this study, reviewed the coding process and themes tables from Chapter Four. He confirmed that the codes and themes were traceable.

Ethics and Methods for Maintaining Confidentiality

Research Ethics Boards at Simon Fraser University and Emily Carr University of Art and Design approved this study. Confidentiality protocols for both identifying and concealing individuals and settings were followed within this study. All of the study participants were given a letter of invitation and a consent form. These documents explained what was being asked of them and the limitations around confidentiality, depending on the interview processes used. Participants were informed as to the lack of confidentiality regarding the use of Skype and email. Interviews only took place after the consent forms had been signed and returned.

To facilitate the confidentiality of the study participants, their names were not recorded in this study. The consent forms from the study participants and their interview transcripts were given a number, ranging from one through fifteen. Each participant's name and number were placed on a master key list. When referring to study participant's quotes or themes within the study, a number was used instead of a participant's name. The interview transcriptions have been housed in a locked filing cabinet and after five years the researcher will destroy these records in a secure manner.

Summary

In this chapter I have described the qualitative research methodologies and the genre of phenomenology that was used in this study. As a qualitative approach to research, interpretive phenomenology places emphasis on the broader philosophical assumptions that are central to the research. Data collection and analysis attempts to move from narrow threads to interpretative, broader themes. In this study, the purpose of phenomenological inquiry is not to solve problems of university-industry research, but to

come to a better understanding of the practice of university-industry research. The next chapter of this study (Chapter Four) presents the results of this study. This has been done through the emergence of the themes, participant quotes and subsequent discussion.

Chapter 4.

Research Findings and Analysis

Introduction

In this chapter I have presented my research findings. This study examined research partnerships between universities of art and design and companies/SMEs. The core research questions in this study were focused on identifying the opportunities and challenges of these types of research partnerships and identifying whether they were regarded as sustainable models of innovation for universities or companies or both.

There are two main sections to this chapter. The first section provides a description of how the data were coded into themes, and the second section provides a summary of the main findings from the data. The main findings, or results, in this chapter have been presented in two ways: in the *crosscutting* themes and the *intra-group* themes. The themes that were most common across all groups are referred to as crosscutting themes. The themes that were most common in each of the individual groups (universities, SMEs and government funders) are referred to as intra-group themes.

As described in Chapter Three, fifteen interviews took place during this study. Five university faculty/directors, five company directors and five government research-funders offered their experiences of university-industry research partnerships. Their voices have provided an opportunity to analyze university-industry research partnerships in the creative sector and beyond.

Coding

This study is in the genre of phenomenology and was built on qualitative research methods. In that vein, the study participants were purposively selected because of their direct experiences in university-industry research partnerships. The interviews were audio recorded, transcribed and then coded. This section describes the coding process in detail.

In a qualitative study like this one, a code is most often a word or a short phrase. It symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute within a text such as an interview transcript (Saldana, 2013). A code has rightly been described as the "critical link between data collection and their explanation of meaning" (Charmaz, 2001, cited in Saldana, 2013, p. 3). Throughout the coding process, it was important to me to keep the data rooted in each participant's own language (Saldana, 2013). Therefore the words selected as codes, and then grouped under themes, were the same words used by the study participants. By using direct quotes and language that are rooted in the study participants' own words, I have attempted to represent their opinions and in-turn reduce my interpretation of the results. However, as Saldana aptly states, coding is, fundamentally, an interpretive act (2013).

The coding process for this study evolved through three main stages. Broadly these three phases were open coding, axial coding and selective coding. The first phase of open coding was built on the identification of words and phrases that were repeated many times throughout the fifteen interviews. The second stage of axial coding was focused on connecting these categories of words under umbrella themes. The oft-repeated words or codes were placed into thematic categories, which were placed under the larger umbrella themes, with smaller sub-themes alongside. This third phase was called selective coding and it identified the umbrella themes that were built into stories that answered the original seven questions.

In the open coding stage, the data from the three groups, universities, companies and government funders, were placed in separate charts. This allowed me the opportunity to compare the groups for commonalities and differences. I was able to build patterns of themes from within the individual interview participants, as well as from, and

across, each of the three distinctive groups. Looking closely at the themes first from the whole group and second, from each individual group, produced what Gibbs (2007) aptly referred to as a set of theoretical propositions. This set of theoretical propositions were directly linked to my original study goals, which were to examine research partnerships between universities of art and design and companies involved in Canada's creative sector, unearth their challenges and opportunities and identify whether they were sustainable models for innovation, for either universities or companies or both.

Testing the Validity and Believability of the Results

For the purpose of providing 'member checks' which checked on the validity and interpretation of the results, nine of the fifteen study participants were sent copies of the results tables from this chapter. Nine study participants were selected because this reflected three study participants from each group (60 percent). The study participants were asked if the themes accurately reflected our interview conversation. All nine of the study participants confirmed that the results tables and themes accurately reflected our interview conversations. In addition to the member checks, Dr. David Kaufman, Senior Supervisor for this study, reviewed the coding processes, theme tables and results. Dr. Kaufman confirmed that all of the codes and themes were traceable. Nonetheless, it is also understood that the qualitative methods used in this study produce information only on the particular cases studied. As a result, any conclusions have been presented merely as propositions and emergent questions.

Themes, Selection and Analysis

There were two ways of identifying and analyzing the themes in this study. The first was through the most common crosscutting themes that all of the groups presented. The second was through the intra-group analysis, which showed the most common themes for each of the groups individually, in this case SMEs/companies, universities and government funders. Each theme selected for discussion in the results section of the study fell into one, or both, of the following two categories:

- Intragroup themes that appeared in one of the groups (SMEs, universities or government funders) were included if three or more (sixty percent) of the five study participants in a particular group presented them (>60%).
- Crosscutting themes that appeared over all of the groups (SMEs, universities and government funders) were included in the results if nine (sixty percent) or more of the fifteen study participants presented them (>60%).

In addition to providing the crosscutting and intra-themes that were presented by sixty percent or more of the study participants, I have also included sub-themes. The sub-themes, sometimes referred to as 'outliers', were themes that did not come up as often. In this case it was with less than 60 percent of the study participants.

The next section in this chapter is a summary and discussion of the findings. To provide a more linear context, the findings have been presented alongside each of the interview questions. The seven interview questions have been presented in the same order as they were asked of each of the study participants.

Findings

In this section the most common codes, themes and sub-themes have been presented and discussed alongside each of the interview questions. The themes and sub-themes have been presented first as intra-group analysis and second as crosscutting analysis. Lastly the most common themes are discussed in more detail and supported with direct quotes from the various study participants. There were fifteen study participants which included five study participants from SMEs/companies, referred to here as C1 to C5; five study participants from universities, referred to here as U1 to U5; and five study participants from government funders, referred here as F1 to F5.

Question 1

Themes, Sub-Themes and Discussion of Results for Question One

To begin the interview, the following question was asked of the study participants:

Question One. Based on your experience, what do you think the factors are that support the initiation and development of research partnerships between universities of art and design and companies/SMEs?

Code Words

The code words and phrases that were used when analyzing the results of Question One were: student hiring; talent acquisition; funding; costs; and university researchers.

The Most Common Intra-group Themes (Individual Groups) >60%

The most common intra-group themes (>60%) from each of the individual groups are presented in Table Two below.

For Question One the study participants were asked the following question: *Based on your experience, what do you think the factors are that support the initiation and development of research partnerships between universities of art and design and companies/SMEs?*

Table 2.   Intra-group Themes for Question One

Q1	SMEs/Companies	Universities	Government Funders
Most common intra-group themes, the number/ percentage of interviewees	1. Talent acquisition, hiring students and graduates – sourcing new employees and having people contribute to their labour force (4 out of 5 or 80%) 2. Funding to cover costs, monetary support (4 out of 5 or 80%)	1. Student hiring, graduate hiring, co-ops and internships (3 out of 5 or 60%) 2. Mutually beneficial exchange in benefits (2 out of 5 or 40%)	1. Funding for low-cost talent (2 out of 5 or 40%) 2. Interest from both researchers and industry (2 out of 5 or 40%) - In Question 1, funders did not present any codes or themes that were repeated over 60%; however their data have been included here for information.

The Most Common Crosscutting Themes (>60%)

Nine out of fifteen study participants (60 percent) responded to Question One with: funding for hiring talent (in the form of student and/or graduate hiring). They

presented funding as a main factor that supported the initiation and development of research partnerships between universities and companies.

The Crosscutting Sub-Themes

Sub-themes were themes that did not come up as often as the main themes. In this case this was less than 60 percent of the study participants. The crosscutting sub-themes for Question One were: mutually beneficial exchanges and interest (in the research) from both university researchers and companies.

Discussion of the Main Findings for Question One

For Question One, funding for talent and hiring talent were presented as the main crosscutting factors that supported the initiation and development of research partnerships between universities and companies. Nine out of fifteen study participants presented this theme. Study Participant C2, from a company, explained this factor in more detail when describing the incentive provided to companies to take part in university-industry research, in this case, through government funding,

> There was an interesting funding relationship where the government matched 50 percent of what the business did. From a business perspective, it was a huge advantage that we didn't have to cover most of the cost…for an extended period of time.

Also referring to the theme of funding, Study Participant U1, from a university stated, "Well, I think a supportive factor is of course money, because small and medium enterprises don't have that much money." Similarly, Study Participant F3 from a government-funding agency reiterated the funding incentive.

> I think that from the local company's viewpoint, some of them are maybe looking for low cost talent. The cost is rather low and there is no commitment from them. They don't have to pay for long-term employee salary, and benefits, etc.

In summary, for Question One, funding for talent and hiring talent was presented as the main crosscutting theme that supported the initiation and development of research partnerships between universities of art and design and companies.

Question 2

Themes, Sub-themes and Discussion of Results for Question Two

The following question was asked of the study participants:

Question Two. What do you think the factors are that hinder the initiation or development of research partnerships between universities and companies in the creative sector?

Code Words

The code words and phrases that were used when analyzing the results of Question Two were: timing; semester; deadlines; pace; student; faculty alignment; ownership and confidentiality.

The Most Common Intra-group Themes (Individual Group Themes) >60%

The most common themes (>60%) from each of the individual groups, the intra-group themes, are presented in Table Three below.

For Question Two the study participants were asked the following question: *What do you think the factors are that hinder the initiation or development of research partnerships between universities and companies in the creative sector?*

Table 3.   Intra-group Themes for Question Two

Q2	SMEs/Companies	Universities	Government Funders
Most common Intra-group themes, the number/ percentage of interviewees (>60%)	1. Timing, semester models timeline, and deadlines (3 out of 5 or 60%) 2. Student/faculty/ company alignment (3 out of 5 or 60%)	1. Timing, semester models, universities run on a different timeline and have different time expectations than companies (3 out of 5 or 60%). 2. Bureaucracy, paperwork, etc. (3 out of 5 or 60%).	1. Time: (universities have a lot of time and companies don't), the time it takes to get things done/pace (5 out of 5 or 100%) 2. IP ownership and confidentiality (5 out of 5 or 100%)

The Most Common Crosscutting Themes (>60%)

Eleven out of fifteen study participants (73 percent) presented the answer of timing, in reference to first, the semester model and second, the difference in the time it takes to get things done (between a university and company). This can also be described as a difference in the pace of getting things done between universities and companies. The study participants presented these themes in response to being asked about what hindered the initiation or development of research partnerships between universities of art and design and companies.

The Crosscutting Sub-themes

Sub-themes were themes that did not come up as often among the study participants as the main themes, that is, less than sixty percent. The overall crosscutting sub-themes that were presented for Question Two were: 1. Student/faculty/company alignment, 2. Bureaucracy, 3. Paperwork, and 4. IP ownership and confidentiality. However, it is notable that, while presenting as an overall crosscutting sub-theme, IP ownership and confidentiality was presented as an intra-group theme by *all* of the government funder study participants.

Discussion of the Main Findings for Question Two

For Question Two, when asked about which factors hindered the initiation or development of research partnerships between universities and companies, study participants regularly referred to timing with reference to the semester model, and the

difference in timing, with reference to the difference in the time it takes to get things done between universities and companies. This can also be referred to the pace in which things get done. Crosscutting all groups, eleven out of fifteen study participants, or 73 percent presented this theme. It is noteworthy that this included *all* of the government funder group of study participants. Another way of describing the theme of timing is describing it as a difference in pace. Companies are focused on getting products or services to market as quickly as possible, whereas universities are focused on exploring a concept or theory as fully as possible with a goal to assess it from many angles. Study Participant C1 described this time difference saying,

> Time always feels like a constraint for us in a company. I guess what the university needs to accomplish and how to build it into their curriculum is some hindrance, but it takes time like some creative thinking and problem solving to figure out how could we do this and how could we work with you (the university).

Study Participant C-1 presented the experience from a company perspective, and the particular challenges of a university's commitment to providing curriculum. Along the same lines, study participant U-3 referred to the timing concerns when they described, what they referred to, as a difference in cultures between universities and companies,

> I think, in these difficult times, companies are a little adverse to risk. And I think that companies are also a little cynical of the university culture…In universities time isn't money so much. We take our time about things. We want to explore everything before we make a decision. And sometimes the university research … it is very creative to us and, when we solve the problem, we're done.

Participant U-3 also spoke to the difference in timelines or pace; drawing attention to the notion that university research culture is different to company research culture, in that, "…time isn't money so much." Also echoing the theme of timing and the cultural differences embedded in universities and companies, study participant F-1 said,

> The expectations of how a research project progresses, they're very different between the two worlds. Researchers at universities and colleges, they have time constraints, but for the most part, they're free to do what they want, when they want and how they want, and that's why they do it. They have that lovely freedom, whereas companies don't have that. They're under a much more constrained atmosphere and expectations. They always say, "Oh, academics, they

just go along and do things at their own speed or they'll put a grad student on it, then that grad student decides they don't like the project so they go off and do something else. That brings everything to a grinding halt." It's just this whole milieu of completely different expectations. Different cultures.

As illustrated in the quotes from the study participants, there were several references to universities and companies as having distinctly different cultures. This will be explored further within this chapter and discussed more in chapter five.

In addition to the crosscutting themes in Question Two, it is notable that *all* of the of the study participants from government funding agencies stated that intellectual property (IP) ownership and confidentiality hindered the initiation or development of university-industry research partnerships. This was in reference to companies and their concerns over confidentiality of ideas or the process and practice of administering IP between the company and university.

In summary, for Question Two, timing, particularly the semester model and the cultural difference in the time it takes to get things done between universities and companies were presented as the main crosscutting themes that hindered the initiation or development of research partnerships between universities and companies.

Question 3

Themes, Sub-themes and Discussion of Results for Question Three

The following question was asked of the study participants:

Question Three. What are the current models of university-industry research partnerships that you are aware of, and to what extent do you think these models function effectively? Are there elements that you might like to change?

Code Words

The code words and phrases that were used when analyzing the results of Question Three were: funding; semester model; program length; and 'skin-in-the-game'.

The Most Common Intra-group Themes (Individual Group Themes) >60%

The most common themes from each of the individual groups, identified as the intra-themes, are presented in Table Four below.

For Question Three the study participants were asked the following question; *What are the current models of university-industry research partnerships that you are aware of, and to what extent do you think these models function effectively? Are there elements that you might like to change?*

Table 4.   Intra-group Themes for Question Three

Q3	SMEs/Companies	Universities	Government Funders
Most common intra-themes, the number/ percentage of interviewees	1. Length of programs and semester models/ timelines. Timelines don't work when they revolve around the semester. (2 out of 5 or 40%)	1. Funding. Companies have to have "skin in the game". (3 out of 5 or 60%) 2. Commitment is higher if they (companies) contribute cash (1 out of 5 or 20%). 3. Matching funds from funding agency (1 out of 5 or 20%)	1. Funding: *Skin in the game*, when companies put cash in (1 out of 5 or 20%).

The Most Common Crosscutting Themes (>60%)

Unlike the other questions in this study, Question Three did not present any codes that were repeated by over 60 percent of the study participants. However, to give a brief picture of the results generated from this question, some of the themes have been identified in Table Four. When responding to the question on university-industry models that function effectively, or elements they would like to change, six out of fifteen study participants (40 percent) responded with funding, particularly companies providing funding to the research project, which was described as "having skin in the game" and, similarly there was mention of government grants with matching funds. Notably in response to this question, *all* of the university study participants presented the theme of funding.

The Crosscutting Sub-themes

Sub-themes were themes that did not come up as often as the main themes. The overall crosscutting sub-themes for Question Three were; shorter grant applications and faster turnaround with grant application results; cross-disciplinary teams; and internships.

Discussion of the Main Findings for Question Three

Unlike other questions in this study, Question Three did not generate any crosscutting themes that were repeated by 60 percent or more by participants across all groups. Speculatively, this may have been a response to the complexity of the question. It was multi-layered and study participants may or may not have parsed their responses. The speculative limitations of this question are discussed further in Chapter Five. However in the intra-group analysis of this question, notably in the university group, *all* of the study participants in that group presented the theme of funding. Study Participant U-4 stated,

> What I have encountered with a couple of the recent grants is that without *skin in the game* there's no commitment, from the company, right…If they had to put money in their commitment would be higher because of that but I think without financial commitment to a company there is not really a reason to stay engaged.

The study participants presented funding as an important theme within current models of university-industry research partnership models.

Question 4

Themes, Sub-themes and Discussion of Results for Question Four

The following question was asked of the study participants:

Question Four. Can you talk about any political, environmental or economic influences and considerations associated with university-industry research?

Code Words:

The code words and phrases that were used when analyzing the results of Question Four were; government; innovation; politics and funding.

The Most Common Intra-group Themes (Individual Group Themes) >60%

The most common themes (>60%) from each of the individual groups, the intra-group themes, are presented in Table Five below.

For Question Four the study participants were asked the following question*: Can you talk about any political, environmental or economic influences and considerations associated with university-industry research?*

Table 5.   Intra-group Themes for Question Four

Q4	SMEs	Universities	Government Funders
Most common intra-themes, the number/ percentage of interviewees	1. The economic downturn and upturn (2 out of 5 or 40%)* 2. Finding and developing talent (2 out of 5 or 40%)* 3. Funding (2 out of 5 or 40%)*	1. Whether current politics are working in our favour (3 out of 5 or 60%)	1. National governments influence – trying to boost innovation, healthy time for university-industry partnerships (4 out of 5 or 80%)

*In Question Four (above), study participants from SMEs did not present any codes that were repeated by over 60 percent; however, they are included here because they contributed to the crosscutting theme.

The Most Common Crosscutting Themes (>60%)

Nine out of fifteen study participants (60 percent) presented the themes of politics, economic upturns and downturns, and the current government as being the considerations associated with university-industry research partnerships.

The Crosscutting Sub-themes

Sub-themes were themes that did not come up as often as the main themes. In this case they came up in less than 60 percent of interviews. The overall sub-themes for Question Four were: funding, and finding and developing talent.

Discussion of the Main Findings for Question Four

For Question Four, the current politics and the current government were presented as the main crosscutting themes across all groups of study participants when asked about the political, or environmental or economic influences that have been associated with university-industry research. Nine out of fifteen study participants, or 60 percent, presented these themes. Study Participant F-2 from a government-funding agency offered the notion that the federal government is influential in university-industry research partnerships when they stated that,

> There is a push by the federal government right now to have more industry-related research programs, especially with universities. For someone who's gone through the research career, it's a two-edged sword. As I spoke earlier, we need to have students prepared to work in industry, because frankly, most of them are going to end up in industry space anyway. The downside is, though, there's a little bit of resistance at the universities, because there is a perception, I think, both real and otherwise, that money's being diverted away from basic research. Basic research is the foundation. It's very important to have that basic research. That is one of the political risks of going too far in this area.

Study Participant F-2 spoke to the influence of the government on university-industry research partnerships, and drew attention to the risks of funding being diverted away from basic research into university-industry research. Study Participant U-4 also echoed this, describing it in the following words:

> The politics are working in our favour at the moment. The conservative government is funding research that directly benefits business. Whether I think that's a good thing globally as a citizen I'm not as certain.

In summary for Question Four, the current politics and the current government were presented as the main crosscutting themes with regard to political, environmental or economic influences on university-industry research partnerships.

Question 5

Themes, Sub-themes and Discussion of Results for Question Five

The following question was asked of the study participants:

Question Five. As a research project between a university and SME progresses, what do you think, generally, are the internal and external elements that contribute to, first, a research project's sustainability; and second, a research project's demise?

Code Words

The code words and phrases that were used when analyzing the results of Question Five were: timing; timelines and people.

The Most Common Intra-group Themes (Individual Group Themes) >60%

The most common themes (>60%) from each of the individual groups, the intra-themes, are presented in Table Six below.

For Question Five the study participants were asked the following question: *As a research project between a university and SME progresses, what do you think, generally, are the internal and external elements that contribute to, first, a research project's sustainability; and second, a research project's demise?*

Table 6.   Intra-group Themes for Question Five

Q5	SMEs/Companies	Universities	Government Funders
Most common intra- themes, the number/ percentage of interviewees	1. Timing (3 out of 5 or 60%) 2. Talent pool (2 out of 5 or 40%)*	1. Timing and timelines (3 out of 5 or 60%) 2. People and relationships (3 out of 5 or 60%)	1. Timelines and alignment between university and company (4 out of 5 or 80%) 2. People, trust and communication (3 out of 5 or 60%)

*Included because of the contribution to the crosscutting theme

The Most Common Crosscutting Themes (>60%)

Ten out of fifteen study participants (66 percent) responded with timing and timelines as contributing to a research project's sustenance and demise. This included the alignment in timing between universities and companies, with study participants making specific reference to the universities' semester model. This can also be referred to as a cultural difference in pace, and has been a reoccurring them across many of the questions in this study.

The Crosscutting Sub-themes

Sub-themes were themes that did not come up as often as the main themes. In this case they came up in less than 60 percent of interviews. The overall crosscutting sub-themes for Question Five were: people, trust and communication, talent pool, contributions and results from both sides. Notably, the themes of people, relationships, trust and communication were presented by 60% of the participants from the university and funder group and are discussed further in the following sections.

Discussion of the Main Findings for Question Five

For Question Five, timing and timelines were presented as the main crosscutting themes contributing to a research project's sustainability and demise. Along the same lines as previous questions in this study, the theme of timing or the cultural difference in pace between companies and universities was re-occurring. Ten out of fifteen study participants, or 66 percent, indicated this. The comments from Study Participant C1 reflected this theme,

> If we have a clear plan of what we want to accomplish and we have the timelines built out and the accountability and we're both committed to it, it's going to succeed. It's clear accountability, integrity on the due dates and commitment to seeing it through and I guess a research project's downfall is what's expected isn't clear at the outcome, what's expected or even what the outcome of the project is, with the vision of the end goal.

Study Participant C-1 from a company clearly identified the need for built-in timelines, outcomes and accountability within university-industry partnerships. Study Participant U-1 from a university described the timing or semester theme from their perspective:

> There again comes the timing, because we have students. Students need to graduate semesters and grades have to be given in and in the end we were able to sort of get the person to come and be there for the final presentation. It all worked out, but there was a lot of tension in that week that we couldn't get a hold of him (the company). I think having the kind of an infrastructure that nurtures that relationship.

Study Participant U-1 presented the tensions in working with the semester-based needs of students, specifically recognizing their needs in their "graduating semesters" and, not being able to "get hold" of their company-based partner in the lead-up to their final week of graduation presentations. SME/company, university and government funder study participants across their respective groups referred to the semester model. Study Participant F-4 from a government-funding agency described the 'timeline alignment' in more detail when referring to university-industry research partnerships:

> I think there's cost expectations and there are performance expectations. I mean one of the challenges is of course, the universities have a tendency, I mean they have a schedule that they run on. They have semesters. They have … people are in school and they're not in school during the summer, or less happens during the summer, so there tends to be expectations of when things can be done, how much time can be really attributed to it, what things can be delivered and the universities are geared around the schedule and the professors and the schedule of the school, and the businesses are geared around the schedule of the business. It needs something to be done in a certain amount of time and again, it's setting the expectations of when things are going to be been done, and how they're going to work is difficult.

Study Participant F-4 reinforced the notion that the semester model, its associated timelines and priorities can contribute to the sustainability or demise of a university-industry research project.

A sub-theme in Question Five, presented by six of the fifteen study participants, indicated that "people, relationships, trust and communication" were contributing factors towards a research project's sustainability and demise. This came from the university and funder groups, where three out of five of study participants in each of those groups referred to "people, relationships, trust and communication".

In summary for Question Five, timing and timelines were presented as the main crosscutting themes contributing to the sustainability and demise of university-industry research projects. The response of pace and timing was a strong theme throughout this study and it was very similar to the most common themes in Question Two. To a lesser degree, nonetheless important to the funder and university study participant groups, "people, relationships, trust and communication" were also presented as contributing to university-industry research sustainability and demise.

Question 6

Codes, Themes, Sub-themes and Discussion of Results for Question Six

The following question was asked of the study participants:

Question Six. How you would define success in university-industry partnerships? What are some of the benchmark success indicators you have used, or currently use?

Code Words

The code words and phrases that were used when analyzing the results of Question Six were: students; employers; products; intellectual property (IP) and commercialization.

The Most Common Intra-group Themes (Individual Group Themes) >60%

The most common themes (>60%) from each of the individual groups, the intra-themes, are presented in Table Seven below.

For Question Six the study participants were asked the following question: *How would you define success in university-industry partnerships? What are some of the benchmark success indicators you have used, or currently use?*

Table 7.   Intra-group Themes for Question Six

Q6	SMEs/Companies	Universities	Government Funders
Most common intra- themes, the number/ percentage of interviewees	1. Talent, finding new employees (3 out of 5 or 60%) 2. IP or new product innovation (3 out of 5 or 60%) 3. Solving problems with usable outcomes (3 out of 5 or 60%)	1. Good experiences for students (4 out of 5 or 80%) 2. Company success – problem solved (2 out of 5 or 40%)	1. Improved products, increased sales, commercialization, patents (4 out of 5 or 80%) 2. Job placements for students (3 out of 5 or 60%)

The Most Common Crosscutting Themes (>60%)

Ten out of fifteen study participants (66 percent) across all groups (SMEs, Universities and Funders) responded that job placements/finding new employees and good experiences for students were the benchmark success indicators in university-industry research partnerships.

The Crosscutting Sub-themes

Crosscutting sub-themes were themes that did not come up as often as the main themes. In this case they came up in less than 60 percent of all interviews. The overall sub-themes for Question Six were: new or improved products; IP and patents; solving problems with usable outcomes; increased sales and commercialization. Notable is the mention of improved products, increased sales, commercialization and patents by four out of five of the government funder study participants. This likely indicates that the government/funder group is looking for practical results and products. Along the same lines, intellectual property (IP) or new product innovation was presented by three out of

five study participants, or 60 percent, indicated that IP and new products/services were important success measures for SMEs/companies.

Discussion of the Main Findings for Question Six

For Question Six, finding new talent, job placements/new employees and good experiences for students were presented as the main benchmarks and success indicators crosscutting over all groups. Ten out of fifteen study participants, or 66 percent, indicated this. Study Participant C-4 from a company described their success indicators,

> Did we create that (IP) and then are there other talents, so we'll be able to recruit new critical employees from the partnership. So for example students coming to work full-time after the research.

Study Participant U-2 from a university explained the main success indicators as:

> I think to have students going through not only getting their masters and PhDs but getting them in a field that makes them employable, giving them a better understanding what the industry's challenges are, and ideally being able to get them employed locally afterwards, is a big success factor for us. I hate seeing people get their PhD, can't find a job locally and then go down to the US somewhere. We'd like to keep them here and prepare them as best as we possibly can.

Participant U-2 described the success measures of getting students and graduates prepared for the job market and hired locally in their fields. Study Participant F-2 described some very specific success measures for university-industry research:

> Success measures that we're looking at are things like… how many international people have we brought in, have they stayed on in the country, do they stay on as academics, do they stay on as careers of industry, how many of them got careers with their industry partners, how do they compare with students that didn't do an internship, for example. Companies, did they get patents, did they develop something new, did they save money, and did they expand their team size to hire the intern, for example.

Study Participant F-2 (above) gave a very specific list of measurable success outcomes from a government funding agency perspective.

In Question Six there were also notable intra-themes that were repeated by 60 percent or more in each of the individual groups. From the government funder group these were: improved products; increased sales; commercialization; and patents (four out of five study participants). From the SME/company group the intra-themes were IP or new product innovation (three out of five study participants).

In summary across all groups, the most common crosscutting themes for Question Six were job placements, finding new employees and good experiences for students as the main benchmarks and success indicators for university-industry research partnerships.

Question 7

Themes, Sub-themes and Discussion of Results for Question Seven

The following question was asked of the study participants:

Question Seven. Do you think research partnerships between universities and companies are sustainable models for innovation (for example: new products, services etc.) in universities and companies?

Code Words

The code words that were used when analyzing the results of Question Seven were: yes, no, sustainable and innovation.

The Most Common Intra-group Themes (Individual Group Themes) >60%

The most common themes (>60%) from each of the individual groups, the intra themes, have been presented in the table eight.

For Question Seven all of the study participants were asked the following question: *Do you think research partnerships between universities and companies are sustainable models for innovation (for example: new products, services etc.) in universities and companies?*

Table 8.   Intra-group Themes for Question Seven

Q7	SMEs	Universities	Government Funders
Most common intra- themes, the number/ percentage of interviewees	1. Yes, research partnerships between universities and companies are sustainable models for innovation (5 out of 5 or 100%)	1. Yes, research partnerships between universities and companies are sustainable models for innovation (3 out of 5 or 60%)	1. Yes, research partnerships between universities and companies are sustainable models for innovation (3 out of 5 or 60%).

The Most Common Crosscutting Themes (>60%)

Eleven out of fifteen study participants (73 percent) crosscutting all groups responded yes, when asked if research partnerships between universities and companies were sustainable models for innovation. Specifically this was *all* of the participants from the SMEs/company group and three out of five participants, or 60 percent, from the university and government funder groups.

The Crosscutting Sub-themes

Sub-themes were themes that did not come up as often as the main themes. In this case they came up in less than 60 percent of interviews. In Question Seven there were very few sub-themes as the majority of study participants expressed the view that university-industry research partnerships were sustainable models for innovation. The sub themes were more like outliers and gave suggestions such as different mechanisms of funding university-industry research, such as funding from the venture capital community.

Discussion of the Main Findings for Question Seven

For Question Seven, crosscutting over all groups, eleven out of fifteen, or 73 percent of study participants answered, "Yes", university-industry research partnerships were sustainable models for innovation. Notably, this included *all* of the study participants from the SMEs and 60 percent of study participants from the university and government funding agency groups. Study Participant C-3 described the sustainability of university-industry research partnerships as:

> I think they are sustainable. I think the outcomes, the copyright ownership stays with the company so from that point of view the

company does get something of value from the process that works for the company.

Study Participant U-5 stated their position when asked if university-industry research partnerships were sustainable models for innovation:

> I don't think I have a choice. And it's mandated in my scorecard. I have to build these relationships. We need them for our grants. We need them for our Tri Council Grants. We need them just for research contracts, we need them, it's an economic issue if we don't have them. We need them because we have targets to hire our students. So we have to include our RAships and our internships as part of our strategic plan. We have real targets to meet. And we need to expand our knowledge creation.

Study Participant U-5 from a university situates university-industry research partnerships in a significant organizational and economic context and this will be discussed further in the theories section of this chapter, particularly in relation to resource dependency theory.

Study Participant F-4 brought up various considerations for the sustainability of university-industry research partnerships from a government funder's perspective,

> I think actually they're sustainable as long as … the industry problem that they're trying to solve continues to have value in solving it. What can tend to happen is that you reach a point of diminishing returns so while professors and the schools may be interested in continuing to pursue an area because it's interesting, from a commercial standpoint, the value that continues to be there doesn't necessarily exist.

While the majority of study participants agreed that university-industry partnerships were a sustainable form of innovation, Study Participant F-3 gave a different perspective, stating, "I think this it is not sustainable in the long run. You always need some kind of public funding to go into the pot in order to make this happen." Participant F-3 went on to recommend a bigger financial involvement from venture capitalists and other sources of funding to offset government funding.

In summary for Question Seven, crosscutting over all groups, eleven out of fifteen, or 73 percent, of study participants agreed that research partnerships between

universities and companies were sustainable models for innovation. Notably this included *all* of the study participants from the SMEs/companies and 60 percent of participants from universities and government funding agencies.

Summary of The Top Thematic Categories from Individual Groups

Summary of The Top Thematic Categories from SMEs/Companies (>60%)

The findings from the interviews with SMEs/companies study participants presented the following top thematic categories arising from all the questions. When asked if university-industry research partnerships were sustainable models for innovation, all of the SME study participants said they believed they were sustainable models for innovation. When asked what factors contributed to the initiation and development of university-industry research partnerships, four out of five, 80 percent of the SME study participants responded with talent acquisition in the form of hiring students and funding to cover costs. When asked about success metrics of university-industry research partnerships, four out of five, 80 percent of study participants in the SME group described improved products, increased sales, commercialization and patents as important success indicators.

Summary of The Top Thematic Categories from Universities (>60%)

The findings from the interviews with university study participants showed the following top thematic categories. All of university study participants presented funding as the top theme affecting the current models of university-industry research partnerships. When asked about the success indicators of university-industry research partnerships, four out of five, 80 percent of study participants from the university group presented 'good experiences for students' as one of their re-occurring top themes.

Summary of The Top Thematic Categories from Government Research Funding Agencies (>60%)

The findings from the interviews with government funding agency study participants showed the following top thematic categories. When asked about factors that hindered the initiation or development of university-industry research, all of study participants in the government funder group presented timing - specifically the difference

in time it takes to get things done between universities and companies. This theme was repeated when asked about the factors that contributed towards a project's sustainability or demise, when four out of five government funder participants presented timelines and alignment of paces between universities and companies. When asked about factors that hindered the initiation or development of research partnerships between universities and companies, all of the government funder study participants presented issues around the ownership of intellectual property (IP) and confidentiality. Specifically, they made reference to companies and their concerns around the practice of organizing IP and confidentiality within university-industry research projects.

In summary, of the top themes for each of the three individual groups: the most common intra-themes for SMEs were talent acquisition and funding for talent, and improved products, increased sales, commercialization and patents. The most common intra-themes for universities were funding and good experiences for students. The most common intra-themes for government funding agencies were timing and timelines, intellectual property and confidentiality. Overall, the theme of timing, specifically the length of time it takes things to get done, the timing of the semester model, and the difference in timelines and pace between universities and companies, occurred repeatedly across all of the three groups.

Summary of Themes

In this chapter I have presented my research findings. This study examined research partnerships between universities of art and design and companies. The core research questions were focused on identifying the opportunities and challenges of these types of research partnerships and finding out whether they were regarded as sustainable models for innovation.

While it is useful to have looked at all of the themes and sub-themes, it is noticeable that they can all be tied back to three main themes. The first main theme was **hiring talent,** in the recruitment of students and graduates. The second main theme was **timing and pace,** which included the semester model and the difference in cultures (timing alignment) between universities and companies. The third main theme was

funding, which includes government and company funding for research and personnel, as well as economic upturns and downturns. The majority of study participants, from universities, companies and funding agencies agreed that university-industry research partnerships were sustainable models for innovation. Building on results from this chapter, the next chapter, Chapter Five discusses the implications of these results, their relationship to theory and the limitations of the study and then makes recommendations for practice, policy and further study.

Chapter 5.

Implications and Recommendations for Further Research

Introduction

In this final analysis chapter, I present assumptions and inferences about the study results. While the previous two chapters presented the overall results, this chapter considers the implications of the results for practice, policy and theory. It also reflects on the surprises and limits found within the study, and looks at the relationship between the results and theory. Lastly the chapter offers suggestions for further research directions.

University-industry research partnerships in the creative sector are the main focus in this study. Of particular interest are the research partnerships between universities of art and design and small and medium size companies (SMEs). Motivating this study is a fundamental concern that, while these research partnerships are on a sharp increase, there is an absence of literature offering insights into the practice of university-industry research partnerships in the creative sector. Research partnerships between universities of art and design and SMEs/companies are relatively new when compared to the one hundred-year history of university-industry research partnerships in the STEM sectors. University-industry research partnerships in the creative sector typically bring together universities, companies and government research-funding agencies, and as such this study made good use of the wide body of literature on university-industry research partnerships in the STEM sectors.

Being cognizant of the wider context for university-industry research partnerships, two significant backdrops are present in this study. First is the current and historical cultural difference between universities and companies. It is evident that the

cultural gap originates in a clear disparity of objectives, where companies need to maximize profits and protect research results, while universities seek to create new knowledge and disseminate it broadly (NSERC, 2012). Second is the growth of academic capitalism, corporatization and neoliberalization of universities. It would be remiss to consider university-industry research in the creative sector exclusive of these significant backdrops.

This study examined university-industry research partnerships in the creative sector: first identifying and discussing their political, economic and environmental contexts and then addressing their opportunities and challenges. Of particular interest is whether these types of research partnerships are considered sustainable models of innovation for universities, companies or both. There is no better way to shine a light on university-industry research partnerships than by asking the people who work within these very partnerships. In this study, fifteen interviews with research directors from: universities, companies and government funders built an account of university-industry research partnerships in the creative sector and beyond, and provided a glimpse into their thought-provoking context, opportunities and challenges.

Methodology

Using the tradition of qualitative research methods and the genre of phenomenology, this study is built on the results from fifteen semi-structured interviews. The study participants were purposively selected because of their working experience in university-industry research partnerships within the creative sector and beyond. Through their various lenses, five university research directors/faculty, five company directors and five government research-funders offered their opinions and observations on university-industry research partnerships and answered the key questions.

This study was well suited to a phenomenological approach as it describes and interprets the experiences of a range of study participants, in this case from the public, private and governmental sectors. The two main branches of descriptive and interpretive phenomenology have become common philosophical approaches in qualitative research. Husserl (1900/1970) stressed intentionality and advocated that human

experience is the source of knowledge (1900/1970), whereas Heidegger (1927/1962), believed that humans are influenced by their lifeworld and he acknowledged that both the researcher and the participants bring their perspectives to an understanding of the phenomena. Both Husserl and Heidegger's descriptive and interpretative models provided a backdrop for the treatment of data in this study.

Research Questions

The participants in this study were asked seven questions. The questions evolved from my experience working within university-industry research partnerships. Designed as open-ended, they created an opportunity for each participant to describe their experiences in university-industry research partnerships. The questions were as follows:

1. Based on your experience, what do you think the factors are that support the initiation and development of research partnerships between universities of art and design and SMEs/companies?

2. What do you think the factors are that hinder the initiation or development of research partnerships between universities and SMEs/companies in the creative sector?

3. What are the current models of university-industry research partnerships that you are aware of, and to what extent do these models function effectively? Are there elements you might like to change?

4. Can you talk about any political, environmental or economic influences and considerations associated with university-industry research?

5. As a research project between a university and SME/company progresses, what do you think, generally, are the internal and external elements that contribute to, first, a research project's sustainability; and second, a research project's demise?

6. How would you define success in university-industry research partnerships? What are some of the benchmarks and success indicators you have used, or currently use?

7. Do you think research partnerships between universities and companies are sustainable models for innovation (for example, new products, services etc.) in universities and/or companies?

The data that came from the interviews were coded and grouped into themes. The themes became the results of this study. Each of the most common themes was presented in Chapter Three and discussed and analyzed in Chapter Four and within this chapter.

Summary of Findings and Discussion of Results

Crosscutting Themes

While it is useful to have traced, identified and discussed all of the themes from the results of this study in the previous two chapters, more relevant to this last chapter is that they can all be traced back to four central crosscutting themes. These themes are present across all groups: SMEs/companies, universities and government research-funders. The first of the central crosscutting themes is:

- *The hiring of talent within university-industry research partnerships.* This focuses on the hiring of university students as research assistants within a research partnership. More specifically, this focuses on the identification and hiring of university students and graduates into companies, both during and after the research partnerships. This can be summed up as the sourcing of talent.

The second central crosscutting theme that came out of the results is:

- *The timing and pace misalignment between universities and companies in university-industry research partnerships*. More specifically, this focuses on the belief that universities have much more time than companies. This theme of timing and pace also points at the influence of the semester model and the deep-rooted cultural disparities in pace, and points to the subsequent differences in practices between universities and companies.

The third central crosscutting theme that emerged from the results is:

- *Funding within university-industry research partnerships.* More specifically, this focuses on government and industry funding that supports university-

industry research partnerships and, within that, the hiring of students. Universities and companies commonly compete for this funding. This funding is used to support both the research and student/graduate hiring and tends to be related to the upturns and downturns of the local, national and global economies and governments.

The fourth central crosscutting theme that emerged from this study is:

- *A significant majority of the study participants support the notion that university-industry research partnerships are sustainable models for innovation for universities, companies or both.* Innovation in this context is focused on the development of new products, services, intellectual property (IP) and ideas both in universities and companies. Notably, all of the study participants from companies support this notion.

In addition to the four crosscutting themes discussed above, the next section describes the most common themes for each individual group of SMEs/companies, universities and government research-funding agencies, and then discusses the implications of these themes.

Intra Themes from Companies, Universities and Government-Research Funders

Each of the fifteen study participants belongs to one of three groups, which are: companies, universities and government research-funding agencies. Equally, there are five study participants in each group. While the results of this study show there are a handful of crosscutting themes that exist across all groups presented in the previous section, there are also intra-group themes common to each specific group. These are described as follows.

The Most Common Themes from SMEs/Companies

The study participants working in companies presented the following three most common themes. First, all of the company participants supported the idea that university-industry research partnerships are a sustainable model for innovation for

universities, companies or both. Innovation here refers to new products and processes. The companies are the only group in the study where all participants supported this belief.

The second common theme amongst the company group was talent acquisition, in the form of accessing and hiring university students. Equally as important to the SME/company group was the government funding that covers these costs. The third common theme arose when company participants were asked about the success indicators in university-industry research partnerships. They presented improved products, increased sales, commercialization and patents as important success indicators in university-industry research partnerships and this ties into their belief that university-industry are sustainable forms of innovation. In summary, the important themes for participants in the company group were acquiring new talent and funding to cover the costs, as well as innovation in the form of improved products and services.

The Most Common Themes from Universities

The study participants working in universities presented the following most common themes. First, all of the university study participants presented funding as the top theme when asked about the important aspects within current models of university-industry research partnerships. Here, funding is focused on government and industry funding for research and students.

Second, when asked about the success indicators in university-industry research partnerships, university study participants presented 'good experiences for students' as a common theme. Here, good experiences refer to students developing new skills, experiences and accessing research or employment opportunities. In summary, the important themes for the study participants in the university group were funding and good experiences for students in university-industry research partnerships.

The Most Common Themes from Government-Research Funding Agencies

The study participants working in government research-funding agencies presented the following most common themes. First, when asked about the factors that hinder the initiation or development of university-industry research, all of the study

participants in the government funder group presented timing and pace. More specifically, this refers to the belief that universities have much more time than companies in a university-industry research partnership, which, from their perspective in turn influences the time it takes to get things done. This is also referred to as a cultural difference in pace between universities and SMEs/companies. Second, and along the same lines as the previous theme of timing and pace, when government research-funders were asked about the factors that contribute towards a research partnerships sustainability and demise, the government research-funding participants presented the difference in timelines and schedule alignment between universities and companies.

Third, when asked about factors that hinder the initiation or development of research partnerships between universities and companies, the study participants in the government research funder group referred to intellectual property (IP) ownership and confidentiality. More specifically, there is an inference that the practice of administering and protecting IP in university-industry research partnerships is a concern in university-industry engagement. In summary, the important themes for the government research-funder group of study participants were the cultural difference in pace and timing, IP and confidentiality.

Overall, the crosscutting themes of funding and difference in pace (between universities and companies) occur repeatedly among and across all three groups. Both speak to the prevalence of the two underlying context and influences in university-industry research partnerships, first the cultural differences and second, academic capitalism. Both are discussed further in this section. Many of the common themes like difference in pace relate to the cultural differences between universities and SMEs/companies. The next section in this chapter looks at these cultural differences in more detail and discusses their implications for practice, policy and theory.

Summarizing the most common themes from all and each group, they are:

Common themes for all groups (overall)	Sourcing and hiring talent (university students and graduates into companies)
	Timing and pace misalignment between universities and companies
	Funding for research and hiring talent (usually government funding)
	University-industry research partnerships are sustainable models for innovation
Common themes for universities	Funding for research and student hiring
	Good experiences and opportunities for students
Common themes for companies	Talent acquisition and funding for that talent
	Improved products, increased sales, commercialization and patents
	University-industry research is a sustainable form of innovation
Common themes for government funding agencies	Timing and pace alignment between universities and companies
	IP and confidentiality

The Cultural Differences Between Universities and Companies and the Implications

One of the central themes in university-industry research partnerships present in this study is the deep-rooted differences in cultures between universities and companies, and the wide-ranging implications of these differences. Many of the themes in the results of this study can be traced back to common cultural differences. This study shows that, while conceivably in a period of transformation, there are still cultural differences that exist between universities and companies. It is evident that the cultural gap originates in a clear disparity of objectives, where companies need to maximize profits and protect research results, while universities seek to create new knowledge and disseminate it broadly (NSERC, 2012). Historically, this difference in objectives has created some noticeable cultural differences in the workings of universities and companies.

Themes in this study, such as the disparity between universities and companies in their timing and pace, are reflective of the difference in objectives and eschewing

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cultures. Because of their fundamentally different objectives, universities and companies attract people with different backgrounds, philosophies and viewpoints. Fittingly this has been explained as academics searching for "the truth through the discovery and dissemination of general principles," whereas businesses focus more on "profit gained through developing and selling products and services" (Burke cited in Bowie, 1994, p. 77). Universities have a generally more relaxed and less urgent sense of the need to "get things done" (Burke cited in Bowie, 1994, p. 77). This is evident in the results of this study, where participants referred to the misalignment in timelines between universities and companies. In this study, participants point to universities on the one hand as being driven by rigid internal schedules (semesters), but on the other hand, with much more time than companies to carry out and disseminate research. Companies not surprisingly are historically driven by product cycles, fast market trends and clear fiscal requirements, whereas universities are more likely to be driven by societal needs and the public good. The fundamentally different objectives and, in turn, cultures of universities and companies are ever-present in the results of this study.

Many of the participants in this study present timing and pace, specifically the belief that universities have much more time than companies as a theme that hinders the initiation or development of university-industry research. This, they say, has an influence on the time it takes to get things done in a research partnership. Along the same lines, many of the study participants from companies and government research-funders present the difference in schedules between universities and companies as contributing towards a research project's sustainability or demise. Eleven out of fifteen study participants present this theme and notably this includes the entire government-funder group of study participants. The cultural difference (real or perceived) in pace is a strong theme in the start-up, functioning and demise of university-industry research partnerships.

Despite the noted cultural differences between universities and SMEs/companies, there are also growing claims and evidence in the results of this study that the university community has adopted the attitudes and values of the business community. This is referred to as academic capitalism, or as Polster and Newson (2015), Zornes (2012) and others describe it, the neoliberal corporatization of universities. More

controversially, this is also described as, "Universities acting as corporations rather than public institutions, in that universities effectively place their private interests over and above the public interest, in a contravention of their obligation and commitment to serve the common good" (Polster & Newson, 2015, p. 2). There is a growing body of literature that supports the argument that universities are adopting the attitudes, objectives and practices of the private sector and these concerns, to many controversial, are a common thread in contemporary studies of universities (Jaeger & Thornton, 2005; Polster & Newson, 2015; Smith, 2011; Turk, 2015; Temple, 2012; Zornes, 2012).

The neoliberal corporatization of universities and the strong foothold of academic capitalism are evident in some of the crosscutting themes in the results of this study, and the repeated theme of funding in particular. This is in reference to funding for university-industry research partnerships from sources external to the university, such as government research-funding agencies or companies. It is common for universities to use considerable internal resources (staff, technology, space) to compete for government and industry funding for university-industry research partnerships. This competitive focus within a university, which can be explained as academic capitalism or neoliberalization, is not without significant implications on the internal culture of the university. This focus on competitive outcomes, in this case the securement of research funding, reinforce the growing claims that the university community is transforming with the adoption of attitudes and values of the business community. The funding and practice of university-industry research partnerships are without doubt a strong building block in this neoliberal transformation and this is discussed further in the next section.

Academic Capitalism and the Neoliberal Corporatization of Universities

Highly present in the broad context of university-industry research partnerships is the growing presence of academic capitalism and the neoliberal corporatization of universities. It would be remiss to consider university-industry research exclusive of this backdrop. Despite the very real differences in cultures between universities and companies outlined earlier in this chapter, rightly there are repeated claims that the university community is adopting the attitudes and values of business. This is evident in

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the widespread practice of universities competing for public and private research funds, like the research funding presented in this study. Universities of art and design, like all other universities, increasingly commit scarce internal resources (staff, technology, space) to the competition and administration of funding that supports university-industry research partnerships. Competitive practices like these are embedded in what Polster and Newson (2015) and Zornes (2012) describe as the neoliberal corporatization of universities and, as evident in this study, increasingly universities of art and design.

There are claims that university-industry research partnerships are a drain on universities and taxpayers (Bok, as cited in Bowie, 2004; Bowie, 1994; Munroe-Blum, 2012). Likewise, there are suggestions that research partnerships between universities and companies burden university administration and divert faculty and graduate students away from their scholastic endeavours into profit making ventures (Bok, as cited in Bowie, 2004; Polster & Newson, 2015). This criticism is not new. In the early nineties Bowie (1994) clearly stated that "university-business partnerships are a subsidy for business" with a recommendation then for businesses to increase their research expenditure for in-house research (p. 100). Twenty years later, as presented in this study there are still concerns that university-industry research partnerships, supported by public funds, subsidize private gain and drain university resources.

Along the same lines, critics question whether university research funded by government and private sectors, like that of the partnerships examined in this study, has the power to be fully independent from its funders (Trani & Holsworth, 2010). As universities are increasingly more dependent on external funding for research, there is pressure "both implicit and explicit to abandon or at least de-emphasize the university's role as conscience of the broader society and to mute potential criticisms" (Trani & Holsworth, 2010, p. 19). If the university has traded its autonomy and lowered its voice for the financial support, it may receive for its research from the government and partnerships with companies, then it must be recognized that those same companies may not have the public interest at heart (Trani & Holdsworth 2010). Many rightly question whether research funded by the government and industry has the power to be fully independent.

Also addressing concerns surrounding the adoption of a commercial agenda by universities, James Turk, who was executive director of the Canadian Association of University Teachers, warns that, by linking research only to business interests, the government will stifle rather than promote growth and advancement (CAUT, 2015). The corporatization of universities, says Polster and Newson (2015), devalues teaching and research. Claims such as this support the idea that we are in an era where the universities' role in acting as a conscience to the broader society has changed, and some would point to university-industry research partnerships as supporting a much more commercial agenda than ever before.

With all of the concerns over university-industry research, many inside and outside the academy have made recommendations that the burden of balance falls on university administration to equalize the amount of pure/curiosity driven research versus industry funded research (Klawe & Whitney, 2003; Temple, 2012). This puts the onus squarely on university administration and governance to safeguard curiosity driven research.

Some of the common themes that have come out of the results of this study relate, to varying degrees, to the two main theories that were introduced in the literature review of this study. The theories are resource dependency theory (RDT) and institutional theory. The next section of this chapter identifies the broad linkages between the themes and the theories.

Study Themes and Relationships to Resource Dependency Theory and Institutional Theory

The two theories presented in the literature review section of this study are Resource Dependency Theory (RDT) and Institutional Theory (IT). Resource Dependency Theory and Institutional Theory are closely linked. They take into account institutions' internal and external influences. I propose that the theories provide useful historical and contemporary references and frameworks for the interpretation of the study themes. Resource Dependency Theory and Institutional Theory are not only evident in the results of this study, but they also reflect my experience of working within university-industry research partnerships.

First, Resource Dependency Theory was chosen for this study because it speaks to the way in which universities are increasingly dependent on their external funders and, in trying to attract funding, display market-like behaviours. Second, Institutional Theory was chosen because it speaks to the different cultures of organizations and their fundamental needs to conform to the rules and belief systems prevailing in their environments. The most common themes that arose in this study, such as timing and pace, funding and hiring talent, relate to the theories of resource dependency and institutional theory to varying degrees. The relationships between theories and themes are discussed in the next section.

Study Themes and Relationships to Resource Dependency Theory

Resource Dependency Theory is relevant to the results of this study because it acknowledges the overriding influence of external resources on institutions. Within the framework of Resource Dependency (and backdrop of academic capitalism, neoliberalism and the corporatization of universities), we can ask questions that focus on the increasing levels of dependency universities have on their private and public funders and how this dependency impacts university culture, university communities and research outputs.

Resource Dependency Theory is also on display in the results of this study. For example, in Question One, study participants were asked about factors that support the initiation and development of university-industry research partnerships. One of the most common crosscutting themes (across all groups) for Question One is, 'funding for hiring talent' in the form of funds for student and graduate hiring. Likewise, the most common theme in the university group is securing funding (financial support from both government and companies). This crosscutting and intra-group theme of funding supports a notion that is central to Resource Dependency Theory: that no organization is completely self-contained. For the funding of their research universities are partly or wholly, dependent on government funding and other industry sources.

Resource Dependency Theory also recognizes that power, in the form of influence (either political or financial) and an institution's dependency on resources are strongly linked. Describing this dependency in more detail, Jaeger and Thornton (2005)

described how outside agencies are able to exert influence over organizations when they control scarce resources that the organizations cannot obtain elsewhere. With so many of a university's key financial dependencies being external, many have rightly questioned the notion of a university's autonomy and independence, and more specific to this study – the autonomy and independence of university-industry research.

Comments by participants in the study point to the presence of RDT. For example, Study Participant U-5 (from a university) describes their relationship to university-industry research partnerships in a way that indicates they do not "have a choice," presenting their participation in university-industry research partnerships as an "economic necessity", in direct reference to securing government funded research grants. Government and industry funding for university-industry research partnerships is a necessity for participant U-5, their university of art and design and conceivably many other universities.

Also indicative of Resource Dependency Theory are common themes that are repeated consistently across the study data from all three of the study groups (SMEs, universities and funders). These are the themes that focus on the outcomes of university-industry research partnerships such as: innovation in the form of intellectual property (IP); new and improved products; increased sales; commercialization and patents. Study Participant F-2, a government research-funder, describes the expectations for university-industry research partnerships by asking, "Companies; did they get patents? Did they develop something new? Did they save money? And did they expand their team size...?" Themes such as saving money, patents and commercialization, historically more associated with the private sector, are presented here as the measurable success outcomes for research partnerships between universities of art and design and companies. These themes reinforce the belief that Resource Dependency Theory (and academic capitalism) has a strong foothold in university-industry research partnerships.

Study Themes and Relationships to Institutional Theory

While Resource Dependency Theory has its roots in external forces, Institutional Theory has its roots inside institutions and organizations. I chose Institutional Theory for

this study because it speaks to the different cultures of organizations and their fundamental need to conform to the rules and belief systems prevailing in their organizational environments (Scott, 2004). Describing Institutional Theory further, Scott describes it as the processes by which structures, schemas, rules, norms, and routines, become established as authoritative guidelines for social behaviour. Furthermore, Institutional Theory enquires into how these elements are created, diffused, adopted and fall into decline (Scott, 2004, p. 2).

There are evidently three distinctive cultures at play within this study: the university culture, the SME/company culture, and the government research-funder culture (particular government agencies or departments) which, in addition, all exist within a political culture. Within the results of this study, the cultural differences between universities and companies came up in themes such as the cultural difference in pace and the distinct difference in objectives between universities and companies. University culture historically has claimed to represent the public good, while the company culture has been driven by a need to maximize profit and market share.

Speaking to Institutional Theory, DiMaggio and Powell (1983, p. 152) supported the idea that universities are important centres for the "development of organizational norms." However, also relevant to this study DiMaggio and Powell (1983) hypothesize that, "The greater dependence of an organization on another organization, the more similar it becomes to that organization, in structure, climate and behavioural focus" (p. 154). Rightly DiMaggio and Powell asserted that, over time, organizations become "isomorphic" with their environments, arguing that, over time institutions that depend on each other become more alike (1983). This further explains what Jaeger and Thornton and many others assert, that universities (and university cultures) are exhibiting more "market like" behaviours to secure external funds for their research (2005, p. 55). This type of isomorphic market-like behaviour in a university is also referred to as academic capitalism and corporatization and can be further contextualized, or explained, within the framework of Institutional Theory.

True to Institutional Theory and in order to survive, universities, companies and government research-funders develop strategies and practices that help them conform

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to the rules and belief systems prevailing in their environments (Scott, 2004). The inclusion of Resource Dependency and Institutional Theory in this study helps explain the results of this study, that show multiple instances of interdependence and isomorphism within, and across, the three groups of: universities, SMEs/companies and government funding agencies. From the results, it is evident that there are the following inter-dependencies and distinctive opportunities for isomorphism:

- SMEs/Companies are dependent on universities for new talent.

- SMEs/Companies are dependent on government funders for the funding of university-industry research partnerships and for the funding of new talent.

- Universities are dependent on SMEs/Companies to hire their talent in the form of students and graduates.

- Universities are dependent on government funders and SMEs/companies to fund their research, students, and graduates working in university-industry research partnerships.

- Government research-funding agencies are dependent on the SMEs and universities to carry out government funded university-industry research (while both universities and companies are the recipients of funding from government research-funding agencies.)

These layers of interdependency provide considerable opportunities for institutional-isomorphism back and forth between universities, SMEs/companies and government research-funders, and are broadly explained through Resource Dependency and Institutional Theory.

With so many of a university's key dependencies being external, many rightly question the notion of its autonomy and independence. Resource Dependency Theory and Institutional Theory both offer a useful lens through which to explain many of the themes and results of this study.

Surprises and Outliers in the Study Results

One of the surprising findings of this study is that a large majority of the study participants support the notion that university-industry research partnerships are

sustainable forms of innovation for universities, companies or both. Innovation here is typically synonymous with the development of new products or services. Sustainability is used here to refer to a capacity beyond the initial university-industry partnerships. All of the SME/company study participants support the idea that university-industry research partnerships are sustainable models for innovation for universities, companies or both. This was the only group in the study where all of the participants support this belief. However, over all groups, eleven out of the fifteen participants agreed that university-industry research partnerships are sustainable forms of innovation.

One outlier statement was found in the government research-funding group. This study participant did not agree (with the majority of study participants) that university-industry research partnerships are sustainable forms of innovation, and gave a noteworthy alternative. They suggested that venture capitalists, rather than the government, be encouraged to financially support university-industry research partnerships. This, in turn they said, would ease the burden on the government and tax paying public. This is noteworthy because it echoes a statement by the World Economic Forum, in its 2015-2016 *Global Competitiveness Report*. The World Economic Forum report suggests that when ranked globally, "Canada should continue to foster innovation at the company level" (2015, p. 25). In world rankings, Canada's company spending on R&D is 26th, which is a drop from a rank of 20th in 2009 (World Economic Forum 2015). This suggests that the practice of private sector investment in R&D is declining within the funding formulas for university-industry research partnerships and this is an important topic for further research discussed in the next section.

Implications of the Results for Policy and Practice

There has been much reported on Canada's lagging record in innovation (Conference Board of Canada, 2015; Government of Canada 2011; NSERC 2012; World Economic Forum, 2014, 2015). Federal and provincial governments have been looking at ways to improve Canada's lagging innovation. However, Canada's significant drop in world rankings for university-industry collaborations from seventh in world rankings in 2009-2010, to nineteenth in 2015-2016 (World Economic Forum 2015-2016) points towards a significant declining investment by government and/or industry in this

R&D category. Similarly, there was a drop in company spending on R&D, from 20th in world rankings in 2009-10, to 26th in 2015-16 (World Economic Forum, 2015-2016). Canada's vehicles for innovation appear to be on a decline.

With Canada's world ranking for innovation on a decline this study may provide useful information to policy developers and policy makers in government, universities, colleges, polytechnics and research funding agencies, as well as policy makers that impact the small business sector. In addition to laying out the factors that support and challenge university-industry research partnerships, it offers an insight into some of the benchmarks for success and the factors that contribute to sustainable models of innovation within university-industry research partnerships.

This study may be of use to research directors and research practitioners, both in the public and private sectors, specifically those who have either contemplated university-industry partnered research, or who already engage in university-industry research in the creative sector and beyond. For such an audience, this study is useful in that it identifies and analyses the broad range of factors that support and challenge university-industry research partnerships, as well as providing the political, economic and environmental contexts.

This study provides fodder for an evolving discussion on the contentious issues that surround university-industry research partnerships, such as academic capitalism, and the neoliberal marketization of universities. It is important to look at university-industry research partnerships in this context as it opens up a useful discussion on pure, or curiosity driven research, versus applied research. This study also points to key questions that have been asked such as: When a university is involved in a myriad of relationships with organizations that are commercially and politically powerful, does university governance need to be designed to safeguard that independence of research (Klawe & Whitney 2003, Temple, 2012)? Current university governance is challenged to provide such safeguards. It is also hoped that this study will be of interest to the general public as it offers an opportunity to have a conversation about the role of universities in the wider society as well as consider the prevalence and impacts of public and private partnerships.

This study identified factors important in the planning of university-industry research partnerships. Taking the themes of, hiring talent, funding, and the cultural differences between universities and companies into consideration in the design of future university-industry research partnerships has the potential to positively influence research outcomes and quite possibly their research impacts.

Limitations to the Scope of the Study

Like any study, there are limitations to the scope of this study and the more apparent ones are listed here.

Research and Development (R&D)

In this study, I focused mainly on university-industry research partnerships. This type of research is usually interwoven in the practice of research and development (R&D). The development aspect of university-industry research partnerships, which includes product, process or service development, while important is mostly beyond the scope of this study. The participation of the development aspect would have significantly expanded the scope of the study, and so it was decided to focus on the research partnerships rather than R&D practice or outcomes.

Students as Research Assistants

Another limitation to the scope of this study is the omission of the experience of university students. While their presence was strongly felt in the findings of the study, specifically in the importance of hiring talent, to include the full experiences of students would have unrealistically expanded the scope of the study. The contribution that students bring to university-industry research projects is substantial and not to be discounted. It was decided early on that the study would focus on the research partnerships, and not the impacts on students.

Limitations of Question Three

Unlike the other questions in this study, in Question Three there were no common themes (presented by 60 percent or more of study participants). It is constructive to question whether the phrasing and wording of Question Three may have

acted as a barrier to study participants. Question Three asked: What are the current models of university-industry research partnerships that you are aware of, and to what extent do these models function effectively? Are there elements you might like to change? The multi-layers in the question may have created a complexity that limited or restricted the responses from the study participants. Or, there may not have been a collated collection of current examples of university-industry partnership models. If I were to redesign the question I would re-phrase it into a less multi-layered format. A more simplified, or shorter version of this question may have engendered more engagement with the study participants and more data results.

The Creative Sector and Beyond

Early on in the planning of this study, it was decided that it be situated within the creative sector. Many of the study participants had experiences of university-industry research partnerships in the creative sector and much farther beyond, for example in the STEM sectors. Many of the research partnerships referred to within the study were interdisciplinary and intersectoral in nature. As interdisciplinary research increases, it will be less necessary to delimit studies like this to particular sectors.

Recommendations for Further Research

This study uncovered several opportunities for furthering this research. First the repeated reference to the evolving cultural differences, or isomorphism between universities and companies – especially the difference in pace between universities and companies – deserves further inquiry. Also related to the theme of pace or timing, there is an anticipated time to payoff (ATP), which has also not been considered in the study. ATP factors in the amount of time that it takes to benefit from an investment in innovation, new products or services. As well questions such as, to what extent have universities and companies aligned their cultures? And if so, what are the implications on both universities and companies when isomorphism takes hold? Questions such as these could be asked in further research studies.

Given that one of the main themes to emerge from this study is the recruitment of talent, another suggestion for further research is focused on student participation and

employment outcomes in university-industry research partnerships. University students were not included in this study. While it is noted that their participation in university-industry research partnerships is very important, and their views would no doubt be a valuable addition, they would have also significantly expanded the scope of this study. While student participation and employment outcomes are well documented in various post-graduation surveys, employment outcomes for students taking part in university-industry research partnerships are a relatively unexplored area of academic study. Questions such as: Are employment outcomes better for university-industry student research assistants than students without research partnership experience? And, do university-industry research partnerships offer beneficial work opportunities for students and graduates? Questions such as these could be asked in further studies.

There is a considerable amount of literature on the themes of academic capitalism, neoliberalism and the corporatization of universities (Bok, as cited in Bowie, 2004; Bowie, 1994; CAUT, 2015; Klawe & Whitney, 2003; Polster & Newson, 2015; Temple, 2012; Zornes, 2012). Being cognizant of the growing presence of academic capitalism and the neoliberal corporatization of universities, it would be remiss to consider university-industry research exclusive of this important backdrop. But, as is evident in this study, this fast changing landscape of university-industry partnered research practice, and its literature, needs to be updated and replenished regularly.

Lastly, and worthy of further study, are the results of the 2015-2016 *Global Competitiveness Report*, by the World Economic Forum. This report points to a significant drop in Canada's world standing in some key areas that are very relevant to this study. In the category of university-industry research partnerships, Canada ranked nineteenth in the world in 2015-2016, compared with its ranking in 2009-2010 of seventh. Similarly, there was a drop in company spending on R&D, from a standing of twentieth in the world in 2009-10, to a standing of twenty-sixth in 2015-16. These drops may indicate a drop in investment from government, industry or both in the funding of university-industry research. It would be useful to know why this drop has occurred.

There has been much reported on Canada's lagging record in innovation (Conference Board of Canada, 2015; Government of Canada, 2011; NSERC, 2012;

World Economic Forum, 2014, 2015). In its 2015-2016 report the World Economic Forum recommended that, "Canada continues to foster innovation at the company level" (WEF, 2015, p. 25). It has been noted that the private sector has been putting fewer resources into research (Smith, 2011). Federal and provincial governments have been looking at ways to improve innovation, and university-industry research has been believed to be one of the ways to boost Canada's lagging innovation. However, the significant drop in world rankings for university-industry collaborations, reported earlier in this study, would indicate a de-investment in university-industry research and this is worthy of further exploration.

Summary

This chapter focused on the implications of the results of this study for practice, policy and theory. It also considered the consistencies, surprises and limits found within the study and offers suggestions for further research directions. This study examines research partnerships between universities and companies involved in Canada's creative sector. It presents the challenges and opportunities in these research partnerships and identifies that they are sustainable models for innovation, for universities, companies, or both. In addition to the main themes of this study, the cultural differences between universities and companies and the corporatization of universities provide both a backdrop and influencer in university-industry research partnerships.

Looking at all of the themes and sub themes present in this study of university-industry research partnerships, it is evident that they are traceable to three main themes presented by study participants. The first of these themes is hiring talent, which focuses on the recruitment of students and graduates into SMEs/companies (a talent pipeline). The second is timing, which focuses on the different pace between universities and companies. The third theme is funding, which focuses on government and company funding for research and personnel.

Universities, like many other publicly funded institutions, are in the throes of redefining themselves. This change, on the one hand, is due to the unprecedented and unstoppable growth of the knowledge economy and its ever-changing career and

business opportunities and digital outputs. As knowledge is created much faster than ever before, university policies and practices are challenged in taking an active role in the ever-changing outputs of the knowledge economy. On the other hand, the uncertainty of government funding for core activities sees universities competing, more than ever before, to secure funding from their external environments. University-industry research partnerships cannot be separated from this transformation and the resulting growth in the neoliberalization of universities. As universities increasingly focus their efforts on competing for government research funding, academic capitalism will continue its widespread growth.

The fast moving tide of the marketization of universities, rightly presents rich dialogue both inside and outside universities. This study presents a variety of important considerations regarding university-industry research partnerships, specifically the precarious funding balance between curiosity-based research versus university-industry applied research. Contentious to some, critics state that the practice of university-industry research partnerships undermines curiosity-based research, with spill over effect. This spill over manifests in not only the marketization of research, but also affects the core services of university teaching and curriculum. University-industry research partnerships and similar models of knowledge translation and mobilization are increasingly found in classes and curriculum. Many would agree that corporate involvement in classrooms is always worthy of public dialogue.

If the World Economic Forum's claim (2015) that "talent-driven economies are the best equipped to adapt to the changes brought about by this so-called fourth industrial revolution and reap their benefits" (p. 32) is correct, then going forward the partnerships examined in this study, between universities and SMEs/companies in the creative sector, will become even more important to Canada's lagging performance in innovation and company R&D. In this study, research partnerships between universities and companies are perceived as sustainable models for innovation, for either universities or companies, or both.

At best, university-industry research partnerships unleash previously untapped innovation and talent; at worst, they undermine the foundations of education, pure and

curiosity driven research and inquiry. Robust and effective governance built on a thorough understanding of the implications of university-industry research, is called for both inside and outside of the academy. Current university governance in the STEM and creative sectors is challenged to stay on top of the vast educational, societal and cultural implications of university-industry research partnerships.

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