# The value of human capital within Canadian business schools

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## Abstract

**Purpose** – The purpose of this paper is to empirically investigate whether an individual's knowledge, skills and capabilities (human capital) are reflected in their compensation.
**Design/methodology/approach** – Data are drawn from university academics in the Province of Ontario, Canada, earning more than CAD$100,000 per annum. Data on academics human capital are drawn from Research Gate. The authors construct a regression analysis to examine the relationship between human capital and salary.
**Findings** – The analyses performed indicates a positive association between academic human capital and academic salaries.
**Research limitations/implications** – This study is limited in that it measures an academic's human capital solely through their research outputs as opposed to also considering their teaching outputs. Continuing research needs to be conducted in different country contexts and using negative proxies of human capital.
**Practical implications** – This study will create awareness about the value of human capital and its contribution towards improving organisational structural capital.
**Social implications** – The study contributes to the literature on human capital in accounting and business by focussing on the economic relevance of individual level human capital.
**Originality/value** – The study contributes to the literature on human capital in accounting and business by focussing on the economic relevance of individual level human capital. It will help create awareness of the importance of valuing human capital at the individual level.

**Keywords** Value, Human capital, Academic performance, Academic salaries
**Paper type** Research paper

## 1. Introduction

> Total wealth includes all sources of income or consumable services. One such source is the productive capacity of human beings and accordingly this is one form in which wealth should be held. Lev and Schwartz (1971, p. 1)

Houghton and Sheehan (2000) and Hospers (2003) identified three sectors that the economy has transitioned through: from an agricultural economy, to industrial economy and to what it is now, an informational economy, in the twenty-first century. Hospers (2003) reflected on Fourastie's work in 1949, which focussed on the transformation of the economy through time, and hypothesised that the knowledge of technology will be the main force that shapes tomorrow. This has seen a shift in the mind-set of top management in businesses to maintain their competitive advantage; from the acquisition and accumulation of land (agricultural economy) (Houghton and Sheehan, 2000) to focussing on the acquisition of physical assets and commodities in a labour-intensive economy to prioritising intellectual capital and human capital, in the current information/knowledge economy (Godin, 2006). According to Hospers (2003), central to the transformation from an agricultural economy to an industrial economy was the law of production, which stated that technology led to the growth of production and, in turn, fuelled the industrial sector. On the other hand, the law of consumption explained the transformation from an industrial economy to an informational economy in the twenty-first century. The law of consumption explained that increased production and the preference for intangible rather than material goods fuelled the informational economy through the increased preference for services (Hospers, 2003). To summarise, "the machine obliges man to specialise in the human" (Hospers, 2003).



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Furthermore, the need for change to an informational economy has also stemmed from the fusion between production and consumption in relation to many activities which formerly involved human beings (Diamond *et al.*, 2013).

This shift from an industrial economy, in which tangible resources were central to development and growth, to a knowledge-based or informational economy has seen an increase in human capital research over the last decade (Lev and Radhakrishnan, 2005). In time, the rise of intellectual capital and human capital has created wealth and value to the economy (Diamond *et al.*, 2013). However, this research attempted to ascertain the association between an individual's human capital and the value an organisation places on that capital. More specifically, the purpose of this research was to determine whether an individual's human capital is captured in his or her remuneration.

The motivation of this study stemmed from previous theories that explained the relationship between an individual's human capital and their earnings. Psacharopoulos (2014) theorised that individuals with higher levels of education and more work experience would have higher wages. Therefore, this study investigated whether the above theories were applicable to a real-life context. It focussed on academics in public universities in Ontario, Canada, where annual salaries of those receiving over Canadian $100,000 are disclosed publicly.

However, as human capital cannot be measured accurately in the form of an individual's tacit knowledge, this study used individuals' human capital which was transferred into explicit knowledge such as written documents, citations among others. The SECI model developed by Ikujiro Nonaka identified this transformation of knowledge from tacit knowledge to explicit knowledge as a process of externalisation (Ordonez de Pablos, 2004). An individual's human capital (tacit knowledge) can then be measured in the form of documents written, citations cited among others (explicit knowledge) (Ordonez de Pablos, 2004).

This has led to numerous studies on human capital, which can be categorised: cross-country analyses, country-specific analyses, firm-specific or industry-specific analyses and individual-specific studies (De Clercq and Dakhli, 2003). There have been several previous studies done on cross-country analyses (Barro, 1999; Jeong, 2002), nation-wide studies, such as in Germany (Koman and Marin, 1999) and Canada (Laroche and Mérette, 2000) and industry- or firm-specific studies (Neal, 1995; Coff and Raffiee, 2015). This study contributed to this body of literature by focussing on individual-specific human capital.

Furthermore, Le, Gibson and Oxley (2003) outlined several distinct measurement bases of which to measure a person's human capital: the cost-based (input) method, the output method and the income-based method. Previous research, conducted to measure human capital, studied these methods independently of each other (e.g. using either the cost-based method, the output method or the income-based method). The output-based approach reflects the human capital of the individual whereas the income-based technique measures the income of that individual. This study used a combination of the output-based and income-based methods to test a theory as opposed to measuring human capital in a specific context.

This study has implications for both employees and employers. Employees seek to identify whether the skills and competencies ingrained within themselves can affect their salary and, likewise, they are rewarded for their human capital. On the other hand, employers seek that remuneration be tied to their employees' skills and competencies. Employers' also seek to investigate whether the greater human capital ingrained in their employees reflect a positive effect on their productive capacity. This study created awareness about whether companies and organisations are protecting, nurturing and rewarding their employees' human capital, and simultaneously providing them incentives to invest more in human capital, by providing a greater monetary incentive. Barring subtle national and cultural differences, the results of this study are applicable to other countries.

The remainder of the paper has been divided into six sections. Section 2 comprises the literature review. Section 3 draws the hypotheses. Section 4 explains the data sampling procedure. This is followed by the descriptive statistics and regression analysis of the data in Section 5. Section 6 provides a conclusion to the research findings and cites the limitations of this investigation. It concludes with suggestions for future research.

## 2. Literature review

### *2.1 Previous studies on human capital*

The early works that focussed on human capital were by economists. According to Nerdrum and Erikson (2001), economists were focussed on the productive effects of the quality of workers, whereas accountants have traditionally focussed on the valuation and measurement effects, which, for human capital, were difficult to measure and quantify.

Human capital took hold in the late twentieth century with studies by Schultz (1961) and Mincer (1984). However, in fact, what was to be known as human capital was discussed several centuries before, most notably in the eighteenth century with researchers William Petty and Adam Smith, followed by Alfred Marshall in 1890 (Nerdrum and Erikson, 2001).

Economists, Petty and Smith discussed the problems that arose due to the differences in labour quality and recommended measuring the value of workers (Nerdrum and Erikson, 2001). In the book, *The Wealth of Nations*, Adam Smith noted that an employee's wages should be determined by the time, effort and money spent to obtain skills required for the specific work (Nerdrum and Erikson, 2001). Spengler (1977, p. 33) added that Adam Smith is quoted as saying "The reward of human capital must reflect the investment embodied in it even as does the reward on other fixed capital". According to Nerdrum and Erikson (2001), Marshall mentioned "the most valuable of all capital is that invested in human beings"; however, neither Adam Smith nor Alfred Marshall used the term human capital to describe this. The early half of the twentieth century saw Economist Irving Fisher, in his definition of capital and income, reiterate that human skills and competencies form as integral a part of capital as being something that gives rise to a stream of income (Nerdrum and Erikson, 2001). Miller (1960) noted that Harold Clark conducted studies on lifetime occupations in selected professions of which human capital played a major role.

Substantial work on human capital was not done until the latter half of the twentieth century. Schultz (1961) and Mincer (1984) studied the investments made in human capital. While Schultz (1961) contributed to the literature by focussing on the macro-economic environment, Mincer (1984) examined the micro-economic environment (Nerdrum and Erikson, 2001). Schultz (1961) identified the effect of a country's policy on human capital stock whereas Mincer (1984) focussed more on investing and increasing the human capital of individuals through school education and education after schooling, and the positive influence on economic growth.

Human capital can be measured using different criteria and has changed over time. Moreover, it is also dependent on the type of study being undertaken. Schultz (1961) and Mincer (1984) conducted theoretical studies, and were focussed on investments made in human capital, whereas recent studies of Mulligan and Sala-i-Martin (1997), Laroche and Mérette (2000) and Boudarbat *et al.* (2010) have centred on empirical studies, focussing on investigating the stock of human capital in different countries at different points in time, using a quantitative based approach.

### *2.2 Human capital theory*

Several researchers have attempted to develop approaches to the human capital theory, and this has resulted in the following publications by Lucas (1988) and Mankiw, Romer and Weil (1992). Human capital was an important component of economic growth; in computing the economic growth of a country (Lucas, 1988). Lucas (1988) investigated the mechanics of an

ever-increasing economic growth rate. Early research on human capital theory was in the form of the human-augmented Solow model, which contributed to the theory of economic growth (Mankiw *et al.*, 1992). This model included human capital as a factor affecting economic growth, among technological change and physical capital. This was also known as the neoclassical growth model (Mankiw *et al.*, 1992). Furthermore, Spengler (1977) added that the sources of human capital consisted of work experience which involved the specialisation of activities and education which was realised through schooling. Thus, Weiss (1995) addressed the human capital theory as:

> Workers with higher levels of education and more work experience tend to have higher wages. Weiss (1995, p. 133)

Furthermore, Weiss (1995) mentioned the signalling theory as an extension of human capital theory. As stated in this theory:

> Higher levels of education and more work experience acts as a signal to firms of an individual's productivity […] which ensues higher wages or salaries. Weiss (1995, p. 134)

Psacharopoulos (2014) explained that this is the case, first, with work experience because the more experience an individual has, the greater the investment that individual has put into on-the-job training and job mobility. However, in contradiction, Psacharopoulos (2014) stated that individuals with higher levels of education have higher wages, not as a sign of their productivity, but because education is used as a screening device.

Many of the theories conceived above originated from the relationship between human capital and the economic growth of countries (Barro, 1999). Lucas (1988) stated that human capital research in the late twentieth century stemmed from the growing inequality between the rich and the poor. Benhabib and Spiegel (1994) also emphasised the importance of human capital as a pre-requisite for economic growth. In addition, Mincer (1984) claimed that the human capital theory was developed because:

(1) the inputs of labour and capital into a productive capacity were far smaller than that of productive output in the USA and other countries; and

(2) the increase in the variance (range) of labourers' incomes was the main component of personal income inequality.

Furthermore, the study by Barro (1999) analysed the contribution of different factors to a country's economic growth. Barro (1999) stated that human capital is an important part of the development process of a country. This statement was justified upon discovering a positive correlation between the years of schooling (a representation of human capital) and economic growth in a country. A more in-depth, country analysis portrayed a strong contribution of the number of years of schooling to the growth rate in advanced economies; USA (0.034) and Canada (0.019) (Barro, 1999). However, the quality of schooling mattered more than the duration (quantity). On the other hand, Benhabib and Spiegel (1994) found no, or an insignificant, correlation between human capital (years of schooling) and economic growth. The data are more profound with the inclusion of African and South American countries, which depicted a negative correlation in the contribution to economic growth (Barro, 1999). The exclusion of these countries did not pose a significant difference.

On comparison of what is known as the four East Asian miracles, namely, South Korea, Taiwan, Hong Kong and Singapore, the following data were recorded (Lucas, 1988). During a 20-year span between 1960 and 1980, these countries recorded economic growth rates of between 6.5 and 7.5 per cent. This led Lucas (1988) to conclude that the key component, owing to the differences in the economic growth rates of middle-income and poor countries, was human capital accumulation.

This finding was not surprising because Singapore has prioritised the immigration of skilled workers with large human capital stocks and have developed a culture of a competitive educational environment with world-class tertiary institutions. This has fostered the growth of human capital stock and the economic growth in the country.

Though the concept of human capital has been advantageous to economic growth, namely, to countries such as Singapore and Hong Kong (mentioned above) and noticed as a form of capital, it has not been realised of its "special character" as mentioned in Bowles and Gintis (1975). Labour is still considered a form of capital, and fails to realise the value of people (Bowles and Gintis, 1975). As Bowles and Gintis (1975) stated, neoclassical economics treated labour as a commodity (consumption expenditure) and human capital realised labour as a form of capital expenditure, but human capital has failed to realise that labour is centred on the people, rather than being an expense. In his book, Becker (1975) stated that initially the concept of human capital had its connotation to slavery; however, the fact that labour and human capital are still considered an expense argues that human capital still has its connotations to slavery.

### *2.3 Types of human capital*

Investments made into human capital can be numerous and, as explained by Mincer (1984), can be gained through school education and education/learning received after schooling (most commonly referred to as on-the-job training). Becker (1975) identified on-the-job training as either general human capital or firm/industry-specific human capital along with that of cultural capital (Bourdieu, 1986).

*2.3.1 General human capital.* According to Becker (1975), general training are those skills and abilities that are beneficial in many firms, besides the firm providing the training. As Lazear (2009) noted, general human capital enabled similar levels of productivity in multiple firms. General human capital increased the marginal productivity of individuals, both in the firm that is providing the training as well as other firms (Becker, 1975). Lazear (2009) and Raffiee and Coff (2016) pointed out that general training includes:

(1) Soft skills that are acquired through learning and education, for example, communication skills.

*2.3.2 Firm/industry-specific human capital.* Lazear (2009) defined firm-specific human capital as those skills that makes the person, who owns the human capital, more in demand/more productive in their current or similar firm/job, but not elsewhere. As opposed to general training, specific training can be characterised as skills and abilities of an individual that increase the marginal productivity of that individual in the firm that provided the training but not useful to other firms or industries.

Neal (1995) stated that previous research had focussed on human capital as being either specific to a firm, or in general; however, none have focussed on human capital stocks needed for a given industry or sector. Neal (1995, p. 654) undertook a quantitative study in demonstrating that:

> Wages in part, reflect compensation for industry-specific skills.

*The Economist* (2007, p. 1) added that:

> In today's economy there is an income premium for higher education and training.

Neal (1995) concluded that wages significantly reflected compensation for industry-specific human capital, among those with experience. Furthermore Chuang and Lee (2004) identified that industry-specific human capital was the strongest contributor to an individual's wage profile, out of all the types of human capital. The publications of Carmichael (1983),

Neal (1995), Lazear (2009) and Raffiee and Coff (2016) reflected firm-specific and industry-specific human capital as:

(2) the seniority and the length of service of the employee (Carmichael, 1983) and organisational routines and culture (Raffiee and Coff, 2016) (firm-specific human capital); and

(3) attending seminars, reading/writing publics and interactions with colleagues and fellow academics (Lazear, 2009) (industry-specific human capital).

Furthermore, Coff and Raffiee (2015) explained that while industry-specific and firm-specific human capital may have contributed greater to earnings than general human capital, in a specific firm/set of firms, firm-specific human capital constrained the mobility of employees to only that specific firms.

The university environment illustrates industry-specific skills, since it values specialised skills associated with holding the position of an academic. This research paper aimed to determine whether the industry-specific skills, namely, their research output, the impact of their research and the academic connections they possess (e.g. publications, citations, H-index, etc.) was reflected in their wages and if so, to what extent.

*2.3.3 Cultural capital.* According to Bourdieu (1986), cultural capital was gained through the experience of different cultures and helped to explain the unequal scholarly achievements of individuals originating from different social status. Such an example is:

(4) An individual who graduated from Harvard has gained more cultural capital than a graduate from a low reputable university (Bourdieu, 1986).

As Bourdieu (1986) identified, this was because of the knowledge and skills the individual has gained from their respective institution through education and socializations (embodied state), the etiquette of students and lecturers at Harvard and quality of education (objectified state) and the social status of graduates from Harvard.

### *2.4 Human capital measures*

Quantitative, empirical studies of human capital have not emerged until recently; the late 1990s and the beginning of the twenty-first century. This was because investments made into human capital, in most part, were non-market activities (Mincer, 1984). However, in recent years, numerous studies have been conducted either in a cross-country or nation-wide setting. Jeong (2002) and Son (2010) conducted their sampling from a cross-country perspective. Nation-wide studies have been more in abundance with studies based in Canada (Boudarbat *et al.*, 2010; Laroche and Mérette, 2000), USA (Mulligan and Sala-i-Martin, 1997) and Germany and Austria (Koman and Marin, 1999). Some of this literature is summarised below.

Most of the quantitative studies that focussed on the measurement of human capital in a country context have been based on past, established measures. Laroche and Mérette (2000) and Le *et al.* (2003) characterised the measures utilised into three different criteria – the input/cost-based measure, the output-based measure and the income-based measure.

*2.4.1 Cost-based approach.* According to Kwon (2009), the input-based approach, also known as the cost-based approach to human capital, was based on the measurement of the cost of those activities that gave rise to the accumulation of human capital. Schultz (1961) cited examples of cost-based human capital as child rearing costs, the cost of education and health and migration costs. Son (2010), who conducted a cross-country analysis of 146 countries used an input variable based on cost (using the years of schooling as a proxy), to predict its correlation with different countries' diverse output levels (economic growth and GDP). As expected, Son (2010) found that the investment (input) into human capital of

low-income countries compared to that of high-income countries significantly contributed to their diverse output levels. The proxy measured by years of schooling represented the quantity of educational attainment, and thus the quantity of an individual's human capital stock. However, the variable in question did not suggest the quality of human capital stock (Barro, 1999). Thus, years of schooling as a variable was made irrelevant as in many disciplines, quality matters more than quantity.

The advantage of using cost-based or input-based measures was that the measures used were established and could be quantified. However, as Dagum and Slottje (2000) mentioned, the use of historical costs brings its disadvantages – such as having to factor in time value of money and depreciation. Second, as Le *et al.* (2003) stated, investments made into human capital (inputs) were created by the demand for those investments and therefore could inflate the true cost, thus deeming the measure inaccurate. Furthermore, it was difficult to quantify intangible costs such as the opportunity cost associated with improving an individual's human capital. The cost of/investment made into the years of schooling was measured based on the opportunity cost of going to school (Laroche and Mérette, 2000). Lastly, the cost-based measure could only cost activities that could can be quantified, which exempted non-market activities, otherwise an important part of human capital accumulation (Le *et al.*, 2003).

*2.4.2 Output-based approach.* The output-based measure, unlike the input-based measure discussed above, focussed on measuring the outputs of an individual's activity or company operations or the education of a nation. The output-based measure was popular in the 1980s and 1990s (Laroche and Mérette, 2000). It showed the association between a nation's human capital and its economic growth and was either nation-specific or a cross-country analysis. Proxies of human capital, using the output-based method included measures of school enrolment and adult literacy rates (Kwon, 2009; Barro and Lee, 1993).

A better measure of human capital stock was to average the years of schooling embodied in the labour force of a country (Psacharopoulos and Arriagada, 1992; Barro, 1999) and total the number of years of completed education (Lau *et al.*, 1991). Most of the research conducted using this method involved cross-country analysis. Psacharopoulos and Arriagada (1992) and Lau *et al.* (1991) sampled 99 countries and 58 countries, respectively; however, the focus of the latter was on developing countries. Kwon (2009), in his publication, explained the reasoning behind using the average years of schooling as a proxy in the study by Psacharopoulos and Arriagada (1992). The reasoning was that productivity increased proportionately with years of schooling (e.g. an individual with 12 years of schooling is 12 times more productive compared to an individual with a single year of schooling), thus reaffirming that average years of schooling was a suitable measure of an individual's human capital (Kwon, 2009). This output-based approach was also evident in the study by Boudarbat *et al.* (2010) who used experience (in terms of age) as a proxy of human capital.

Laroche and Mérette (2000) explained that the years of schooling/average years of schooling could be used as an input variable as well as an output variable, depending on how an individual perceived, years of schooling to be. Years of schooling measured using the cost-based approach (input variable) measured the investment made into those years of schooling, whereas when used as an output variable, it measured the educational attainment of a person (Laroche and Mérette, 2000).

Le *et al.* (2003) explained that using education as output-based proxies disregarded human capital accumulation after school (e.g. at work). The average years of schooling were also not an accurate measure of productivity. Instead, work experience or publications might perhaps have been a better measurement to test the theories of Psacharopoulos (2014), among others.

*2.4.3 Income-based approach.* The rationale behind income-based human capital was based on the assumption that human capital stock was reflected in the individual's income.

Moreover, as mentioned in Laroche and Mérette (2000), there has been empirical evidence that suggested that a worker's productivity (measure of human capital) increased with education and work experience and that the worker's productivity (using the income-based approach) was measured by their income.

The labour income-based measure (LHK), conceived by Mulligan and Sala-i-Martin (1997), took the income of any individual and divided it by the income of an individual with no education. The greater the level of income left after dividing the above, the greater the level of human capital stock the individual had. The reasoning behind this was that the income of an individual was made up of individual skill and the aggregate stock of physical capital available to the individual (Mulligan and Sala-i-Martin, 1997). The individual with no education had access to physical capital but possessed a lower level of human capital that reflected human capital as the residual effect. Jeong (2002) adopted a similar method to that of Mulligan and Sala-i-Martin (1997); however, unlike Mulligan and Sala-i-Martin who used the individual with no schooling as their baseline, Jeong (2002) used that of industrial labourers as his baseline (Le *et al.*, 2003). The variable of industrial labourers was a better measure when doing cross-country studies, as there is a universal definition, of an industrial labourer as mentioned by the International Labour Office (Le *et al.*, 2003), whereas an individual with zero schooling was a subjective measure and the respective definition varied between countries. The advantages with these methods were that they both excluded the component of physical capital (Mulligan and Sala-i-Martin, 1997).

The income-based approach, although a valid measure, may be both realistic and controversial. As mentioned in Le *et al.* (2003), the above approach was based on off-market prices, as opposed to historical prices, it would have been a better reflection of an individual's human capital stock. The information was also more easily accessible than historical prices (Le *et al.*, 2003). However, the above approach assumed that an individual's human capital was the sole contributor to that individual's salary (Laroche and Mérette, 2000).

The income-based approach was fundamentally lacking, as productivity was not necessarily a good representation of human capital, as an individual may have a large human capital stock, but if that stock was not fostered appropriately, productivity could be lacking. Second, income was not a sufficient representation of human capital. Using the illustration of Jorgenson and Fraumeni, Le *et al.* (2003) mentioned that their approach involved assuming that people who did not work or go to school (0–5 years old, $< 75$ years old) and those who did not work but attended school (5–13 years old) had zero human capital stock and only those who did work and received income would have human capital stock. This translated to those who do not earn income, and do not have access to human capital, which is not true. However, a drawback of why this measure lacked accuracy was that there may not be a clear relationship between income and human capital and secondary factors such as age, gender, field of work, rank, etc., would have an effect on income (Laroche and Mérette, 2000; Le *et al.*, 2003).

In testing the relationship in this study, the fundamentals of the income-based and output-based approaches were used. The income-based approach was measured by using an individual's income whereas the output-based measure used proxies of research output; publications, citations, ResearchGate scores (RG score) and the Hirsch index (H-index). The combination of these two techniques allowed the research to mitigate some of the disadvantages of the individual approaches. First, using output-based measures reflective of industry-specific skills ensured that Neal's theory was thoroughly tested. Second, the inclusion of work-related measures ensured that human capital accumulation acquired throughout the individuals' school and work was included. Lastly, the measure included activities giving rise to human capital that could not be quantified or were non-market transactions (Figure 1).

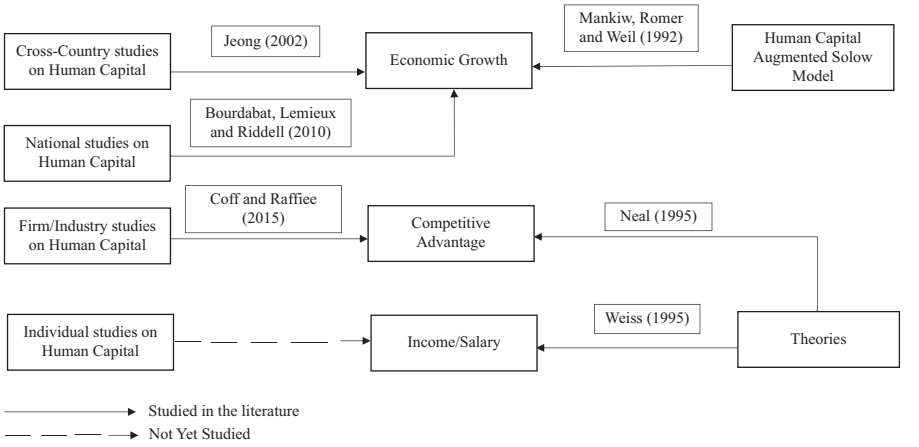


**Figure 1.**
Outline of studies

## 3. Hypothesis development

### *3.1 Association between human capital and salary*

Ordonez de Pablos (2002) defined intellectual capital as the organisational knowledge that was utilised to create wealth for the individual or the company and, as Lev *et al.* (2005) put it, knowledge that could provide a firm with a competitive advantage. Part of this knowledge is in the form of skills, competencies and abilities and is what was known as human capital (Stewart, 2007). Human capital was a source of competitive advantage and a source of wealth creation for firms.

*3.1.1 Theoretical standpoint*. Weiss (1995), *The Economist* (2007) and Psacharopoulos (2014) stated that individuals who have a higher level of education and more work experience tended to have higher wages. This implied that an individual with more human capital would draw a greater income than another with less human capital. However, a more focussed theory by Neal (1995) stated that wages/income, in part, reflect the amount of industry-specific skills and knowledge an individual has acquired, and which, according to Chuang and Lee (2004) is the form of human capital that mattered most in determining an individual's wages. The latter theory focussed on industry-specific human capital. These included the effective control and passing of the ball for a footballer or familiarity with the law for a lawyer. Industry-specific skills associated with the tertiary education industry included that of teaching, research productivity (number of publications) and impact of research (citations and H-index) among others. However, the extent of the compensation received varied from industry-to-industry depending on whether it was a specialised industry and whether the skills/abilities were in high demand.

Moreover, the triangular relationship between the output-based measurement, the income-based measurement and human capital motivates the hypotheses. Based on previous quantitative studies, it can be surmised that an individual's income is a reflection of human capital and so the reflection of an individual's output of human capital. Given this, an individual's income and his/her output should have a positive correlation.

*3.1.2 Practical standpoint*. In practice, there are many factors which determine an individual's remuneration, not only that of an academics' research. According to Gravestock and Greenleaf (2008), Chant (2005) and Statistics Canada (2010), an academics' remuneration was determined by education level, academic position, research, teaching and service contribution to the university, among others. However, according to Chant (2005), the most important criteria in academia was research, commonly measured by the number of

articles/publications in peer-reviewed journals. This was more so the case in a position as an associate professor or full professor, and in which, according to Statistics Canada (2010), there were positions which got paid more. This been said, associate professors and full professors with senior administrative responsibilities earned more than their respective counterparts without senior administrative responsibilities (Statistics Canada, 2010).

The combination of the theoretical and practical standpoints mentioned above lead to the hypotheses that:

*H1.* The number of publications has a positive association with an academic's salary.

*H2.* The number of citations received has a positive association with an academic's salary.

*H3.* The number of reads has a positive association with an academic's salary.

Furthermore, the strong influence of business research on industry practice, as mentioned by Williams (2016), and the increasing importance of networking, both in industry and research has made for the following hypothesis:

*H4.* The number of profile views of an academic has a positive correlation with his/her salary.

### *3.2 Association between the H-index and salary*

Lastly, the ResearchGate score (RG score) is a score assigned to a researcher as an indication of a sum of factors including the number of publications produced, citations received, reads and profile views. On the other hand, the H-index addresses the impact of the academic's research publications in terms of the number of citations a publication has received. Thus, the two measures reflect different aspects of a researcher's profile.

As explained by Bornmann and Daniel (2007), the Hirsch index, commonly known as the H-index, and named after Jorge Hirsch in 2005, is a measure of the visible impact of a researcher's work (publications) on the wider academic community. In its simplicity, the H-index is based on the number of citations received per publication (Bornmann and Daniel, 2007). For example, an H-index of 5 implies that a researcher has received at least five citations for five of his/her publications. According to Hirsch (2005), the "H-index measured the broad impact of an individual's work (p. 1)".

Furthermore, Hirsch (2005) and Bornmann and Daniel (2007) stated that the H-index gave an indication of whether the researcher had a broad and sustained impact or whether they were inconsistent and what Bornmann and Daniel (2007) called a one-hit wonder. Hirsch (2005) also stated that the H-index gave an indication of the researcher's productivity:

*H5.* The ResearchGate score (RG score) and Hirsch index (H-index) have positive associations with an academic's salary.

## 4. Data collection

### *4.1 Sample selection*

According to The Public Sector Salary Disclosure Act of 1996, organisations that received funding from the Province of Ontario (public organisations) had to disclose salaries of employees earning more than $100,000 in an academic year (Sandals, 2015). The public database of salaries reports salaries of all public sector employees who earn greater than $100,000 across areas such as hospitals, medical boards, municipalities and universities among others. This study only focussed on academics in public universities in Ontario.

However, tertiary educational institutions that do not have status as a university and instead are university colleges were excluded. The reason for this exclusion was because unlike universities that offer both undergraduate and postgraduate degrees and put a large emphasis on research, university colleges only offer undergraduate diplomas and degrees and are not very research-intensive (Ontario Council of Agencies Serving Immigrants, 2016). This research focussed on the research aspect of an academic's human capital. Thus, it would have been inappropriate to combine academics of universities and university colleges into a single sample. Furthermore, insufficient data regarding academics' university profiles' inhibited us from sampling those universities, not considered as university colleges, which were previously excluded.

In addition to focussing solely on universities, the following sample only consisted of academics in the business schools who specialise in the discipline of management, accounting and finance. Thus, universities' that do not have an active business school and academics who do not specialise in management, accounting or finance were excluded from this sample. Furthermore, this research used ResearchGate to collate information on an academic's raw human capital data (publications, citations, reads, profile views, RG score and H-index). For the purpose of standardisation, ResearchGate was the only source used to gather this information. Google Scholar was not used as a source of information as publications enlisted under a researcher were not necessarily authored by that researcher. Researchers with similar names are often confused on Google Scholar, whereas ResearchGate uses a researcher's peers to ensure publications listed under a researcher is correct. Although ResearchGate is not free from drawbacks, information on ResearchGate is more reliable than Google Scholar. Thus, academics who do not possess a ResearchGate account were not sampled.

However, unlike previously mentioned exclusions, exclusions of academics who did not specialise in the disciplines stated above and who had no current ResearchGate account could not be accurately measured. There were over 17,000 academics in the total population, and would be impractical to note the subject discipline of each individual. Thus a random sample of assistant professors, associate professors, full professors and deans from management, accounting and finance were collated. Tables I and II outline the exemptions made to the following sample and the composition of the final sample of 187 by universities.

### *4.2 Regression analysis*

The regression analysis commenced with the development of the control variables, independent variables (also known as the test variables) and the dependent variable. The regression examined the effect of a combination of test variables on one or more dependent variables.

| | Exclusions | | |
|---|---|---|---|
| | Academics | Universities | Total |
| Total population | | | 17,064 (35 universities) |
| Less: exemptions | | | |
| University colleges | 142 | 3 | |
| No active business school | 578 | 15 | |
| Insufficient data | 300 | 1 | |
| Academics not in management, accounting or finance | Number of academics' excluded is unknown | | |
| No ResearchGate account | Number of academics' excluded is unknown | | |
| Sample | | | 187 (16 universities) |

**Table I.**
List of exclusions

| Name of university | Sample | % of total |
|---|---|---|
| Brock University | 12 | 6.42 |
| Carleton University | 13 | 6.95 |
| Laurentian University of Sudbury | 8 | 4.28 |
| McMaster University | 11 | 5.88 |
| Nippising University | 3 | 1.60 |
| Queen's University | 14 | 7.49 |
| Ryerson University | 8 | 4.28 |
| University of Ottawa | 18 | 9.63 |
| University of Guelph | 11 | 5.88 |
| University of Ontario Institute of Technology | 4 | 2.14 |
| University of Toronto | 21 | 11.23 |
| University of Waterloo | 18 | 9.63 |
| University of Western Ontario | 11 | 5.88 |
| University of Windsor | 13 | 6.95 |
| Wilfred Laurier University | 9 | 4.81 |
| York University | 13 | 6.95 |
| Total | 187 | 100 |

**Table II.** Composition of final sample



The human capital data gathered from ResearchGate comprised of an academic's publications, citations, reads, profile views, RG score and H-index. These variables were obtained directly from ResearchGate and were not adjusted in any way. The latter two independent variables (the regression factor scores) reflect a score factored by IBM SPSS. REGR Factor Score_Pub_Cit_Re_PV incorporated the data of an academic's publications, citations, reads and profile views into a single factorised score. REGR Factor Score_RG_H-index incorporated the data of an academic's RG score and H-index into a single factorised score.

Model 1:

$$Salary = \alpha + \beta_1\ Publications + \beta_2\ Citations + \beta_3\ Reads + \beta_4\ Profile\ Views + \beta_5\ Control\ Variables + \varepsilon.$$

Model 2:

$$Salary = \alpha + \beta_1\ RG\ Score + \beta_2\ Control\ Variables + \varepsilon.$$

Model 3:

$$Salary = \alpha + \beta_1 H - index + \beta_2\ Control\ Variables + \varepsilon.$$

Model 4:

$$Salary = \alpha + \beta_1\ REGR\ Factor\ Score\_Pub\_Cit\_Re\_PV + \beta_2\ Control\ Variables + \varepsilon.$$

Model 5:

$$Salary = \alpha + \beta_1\ REGR\ Factor\ Score\_RG\_H - index + \beta_2\ Control\ Variables + \varepsilon.$$

## 5. Data analysis

### *5.1 Descriptive statistics*

Table III along with Figures 2–4 show the descriptive statistics for the variables of human capital tested in this study. The range for the distributions in the variables was large; thus, the sample cohort of 187 consists of academics with small stocks of human capital and large

stocks of human capital. Because of this, the standard deviation of some of the variables was large. The skewness of the population showed that some intellectual capital variables were skewed to the left allowing for some very large stocks of human capital. These characteristics were reflected in the academic's salary, shown by a maximum value of $346,831.44, but with a mean value of $187,984.66. An explanation for the skewness of some of the variables arises from the fact that more than 50 per cent of the academics sampled were either of assistant professor or associate professor status, who had lower intellectual capital scores than professors and earned lower salaries than that of deans or Head of Departments (HoDs) (Figure 2).

**Table III.**
Proxies of human capital – descriptive statistics

| | Sample | Minimum | Maximum | Mean | SD ($\sigma$) | Skewness |
|---|---|---|---|---|---|---|
| Publications | 187 | 1 | 264 | 29.47 | 36.39 | 3.50 |
| Citations | 187 | 0 | 10,989 | 605.98 | 1,347.89 | 5.13 |
| Reads | 185 | 6 | 66,967 | 2,461.01 | 5,948.94 | 7.65 |
| Profile views | 185 | 2 | 1,438 | 221.16 | 201.91 | 2.68 |
| RG score | 178 | 0.16 | 41.57 | 13.96 | 8.46 | 0.68 |
| H-index | 172 | 1 | 54 | 8.60 | 8.42 | 2.50 |
| REGR Factor Score_Pub_Cit_Re_PV | 185 | −0.78 | 8.46 | 0.00 | 1.00 | 4.72 |
| REGR Factor Score_RG_H-index | 172 | −1.29 | 4.43 | 0.00 | 1.00 | 1.51 |
| Salary | 187 | $101,691.80 | $346,831.44 | $188,284.91 | $53,765.66 | 0.92 |

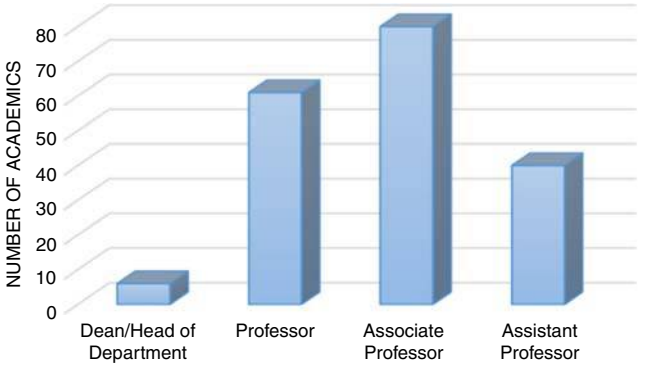


**Figure 2.**
Position held by acdemics sampled

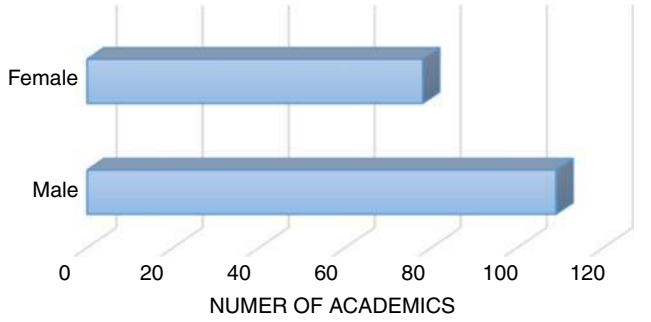


**Figure 3.**
Gender of academics sampled

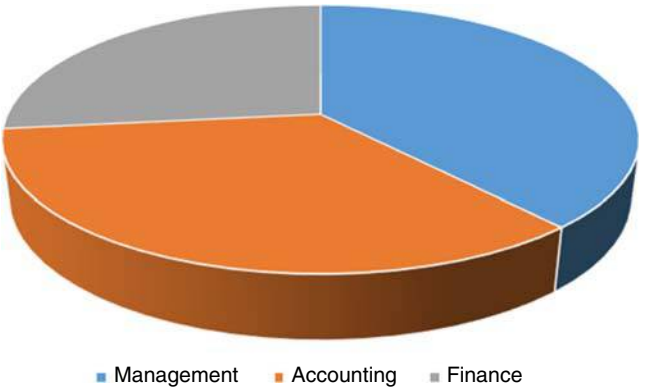


**Figure 4.**
Subject discipline of academics sampled



Figures 3 and 4 show the gender of academics sampled and the subject discipline of the academics respectively. As can be observed, more male academics than female academics were sampled. Figure 4 portrays that there are more academics in management, followed by those in accounting and finance, respectively.

### *5.2 Regression analysis*

Table IV shows the associations between the independent variables and the dependent variable. The total $R^2$ signifies the strength of the model in predicting the income received by academics (salary). The five models regressed above show that 37.4 per cent (Model 1), 38.9 per cent (Model 2), 39.4 per cent (Model 3), 34.0 per cent (Model 4) and 40.8 per cent (Model 5) of the variance in salary can be predicted and is dictated by the human capital variables tested in each model. Additionally, of importance is that the models are significant to two significant figures, as illustrated by the *F*-statistic.

| Variables | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|---|---|---|---|---|---|
| *Step 1: controls* | | | | | |
| Management | | | | | |
| Accounting | 0.202* | 0.255** | 0.200* | 0.211* | 0.231** |
| Finance | 0.136 | 0.208* | 0.179 | 0.136 | 0.199 |
| Rank | −0.297** | −0.122 | −0.177 | −0.308** | −0.119 |
| Gender | 0.024 | 0.013 | 0.024 | 0.038 | 0.021 |
| *Step 2: predictor(s)* | | | | | |
| Publications | 0.026 | | | | |
| Citations | 0.360** | | | | |
| Reads | −0.161 | | | | |
| Profile views | 0.224 | | | | |
| RG score | | 0.537** | | | |
| H-index | | | 0.507** | | |
| REGR Factor Score_Pub_Cit_Re_PV | | | | 0.376** | |
| REGR Factor Score_RG_H-index | | | | | 0.559** |
| Total $R^2$ | 0.374 | 0.389 | 0.394 | 0.340 | 0.408 |
| Adjusted $R^2$ | 0.346 | 0.371 | 0.376 | 0.322 | 0.390 |
| *F*-statistic | 13.170** | 21.902** | 21.601** | 18.451** | 22.883** |
| *N* | 185 | 178 | 172 | 185 | 172 |

**Notes:** *One significant figure (0.05); **two significant figures (0.01)

**Table IV.**
Regression analysis of the variables of human capital against salary

Model 1 illustrates the association between the variables of human capital excluding the RG score, H-index and factorisation scores against salary. Model 1 shows that publications, citations and profile views, expectantly, have a positive correlation with an individual's salary; however, only the number of citations received by a researcher is significantly associated ($p < 0.01$). This may suggest that in the research field, the quality of the research produced has a greater impact on human capital stock than the quantity of research produced (characterised in this study by the number of publications). Thus, the quality of research dictates a researcher's salary more so than the quantity of research. The number of profile views, despite being positively correlated, was not significant.

A surprising relationship arising from this study was the negative correlation between the number of reads and an academic's salary. According to Bengsch (2015), the number of reads was counted when someone accessed, downloaded or read the research summary or full text of an academic's publication. The wide scope of the criterion allowed for a variety of intentions for accessing, downloading or reading the research. Despite showing the popularity of the piece of research, it is not an accurate measure of human capital, as downloading of the research could be either accidental, used as a starting reference, or could be used as a citation. The inaccuracy of this measure and the lack of control in counting the number of reads may have resulted in this negative correlation in predicting an academic's salary.

Models 2– 5 all show a strong positive association of the intellectual capital independent variable to an academic's salary ($p < 0.01$). For a single dollar ($) increment in salary, the RG score contributed 0.537 points, whereas the H-index contributed 0.507 points.

A similar conclusion could also be drawn with the factorisation scores in Models 4 and 5. Models 4 and 5 closely depict that of previous models regressed. The reason for this was that the factored scores were closely linked and correlated to the previous variables regressed. REGR Factor Score_Pub_Cit_Re_PV is comprised of variables regressed in Model 1, whereas REGR Factor Score_RG_H-index is comprised of variables regressed in Models 2 and 3. However, Model 4, which combines publications, citations, reads and profile views into a factored score, was less reflective of an academic's salary than the four variables regressed individually as in Model 1. Model 5, which combined the RG score and H-index into a factored score, was more reflective of an academic's salary than when the RG score and H-index were regressed individually.

Overall, the results above indicated that the RG score and the H-index were more effective human capital variables than publications, citations, reads and profile views, in predicting the variability of an academic's salary.

Conclusions can also be drawn from results regarding the control variables. First, the academic ranking of an individual had a negative correlation to his/her academic salary. This was due to the categorisation of the academic ranking system, previously outlined in Chapter 4. The ranking system was organised as "1" being that of a dean and an HoD and "4" being that of an assistant professor. Therefore, individuals of higher academic standing, and positions of higher responsibility and accountability received larger salaries.

Furthermore, salaries were largely relevant to academics in the field of accounting than in finance. Salaries of academics in accounting were larger than that of finance academics. Accounting was significantly positively correlated in all five models as compared to finance (Table IV).

### *5.3 Discussion*

All the five models confirm the hypotheses developed in Chapter 3, in that the proxy variables of human capital (publications, citations, H-index, etc.) correlate positively to an academic's salary. However, this is not without an exception, as the number of reads negatively correlates to salary. In hindsight, this was probably because of the multifaceted nature of the measure. Furthermore, the results conform to the theories conceived earlier.

Additionally, the results portrayed above can only be generalised to academics within the management, accounting and finance disciplines in Business schools within the Province of Ontario, Canada.

However, the results proved the theories of Neal (1995) and *The Economist* (2007) more so than that of Weiss (1995) and Psacharopoulos (2014). This is because of the limitations in the proxies tested. The study could have been more conclusive if the study included variables of human capital incorporating an academic's teaching expertise, supervisory duties, education and work experience. In this way, the study would have been more reflective of an academic's teaching and research responsibilities in higher institutions and thus more closely linked to the theory developed by Psacharopoulos (2014). However, the current study did not include negative measures of human capital such as negative feedback from students, and measures of Not in Education, Employment or Training (NEETs) and how these measures affected academics remuneration. Such measures would be more accurately reflected in a qualitative study (proxy based on negative student feedback), and studies not centred solely on academics or educated individuals (measured of NEETs).

The results also lead to some very interesting dilemmas. The results strengthen the debate between the quantity and quality of human capital. Through the results, it has been seen that the quality of human capital has more emphasis than the quantity of human capital when associated with salary, and supported by the fact that citations was significantly correlated to an academic's salary. However, the quality of human capital is difficult to measure as rankings of (e.g. publications, citations) do not reflect research quality (Frey and Rost, 2008). According to Frey and Rost (2008), the number of publications published does not reflect quality as it fails to consider the impact scores of journals published, whereas citations does not account for whether research contributions are positive or not and can be distorted as publications can be cited even if they were not read. Thus, the H-index can overstate a researcher's or academic's quality. Frey and Rost (2008) used a proxy of the number of editorial boards an individual is on. Though, the latter proxy may be more reflective of quality of human capital. Frequent questions of research, namely, has the researcher made a positive contribution and is the research useful, can never be measured quantitatively.

Despite the generalisability of results only being applicable to business schools within Ontario, the idea and contribution of this study can be applied beyond state and national borders; in a knowledge-based economy it is important to value human capital accordingly. This study provided one method to value human capital among others. In the short term, this study will create awareness to identify individual-level human capital as a component to build an organisation's structural capital (Ordonez de Pablos, 2004). Ordonez de Pablos (2004) defined structural capital as knowledge that a company retains excluding that of an individual's human capital such as knowledge from an organisation's routines, processes and databases. In short, structural capital facilitates knowledge transformation from an individual's human capital (tacit) to explicit knowledge. Although it is important for companies to unearth their employees' human capital, it is more important that their employees' human capital go well with an organisation's structural capital. Even though more human capital might reflect an academic's remuneration at the individual level, a team of academics who have less human capital, individually might achieve more in part to an organisation's structural capital.

## 6. Conclusion

Human capital is not a particularly recent phenomenon, having started in the late twentieth century. Although there are many theoretical and empirical articles on cross-country or nation-specific and industry-specific studies, research at the individual level is thus far limited. The present study was aimed at determining if an academic's knowledge, skills and abilities (human capital) are reflected in his/her salary. Based on prior research, many researchers have theorized a positive relationship between an individual's human capital and their projected income; more

education, work experience and industry-specific skills are compensated for in an individual's salary and therein lies a premium for one's human capital. This study sampled 200 academics across the business schools of public universities located in the Province of Ontario.

As hypothesised, the results suggested a positive correlation between an academic's stock of human capital and the individual's income. Although some measures of human capital (e.g. gender) proved insignificant, the number of citations, the Hirsch index (H-index) and the ResearchGate score (RG score) proved to be highly significant in their positive correlation to income. This is most probably due to the scope of the measure and their effectiveness in measuring human capital. The number of publications and profile views of an academic, though positively correlated, were insignificant in their relationship. In hindsight, the result is best explained by the quality vs quantity debate. The findings clearly show that the quality of an academic's research output (the academic's number of citations and H-index) carried more weight that the quantity of research output with regards to their stock of human capital (the academic's number of publications).

This research has practical implications for universities and other industries alike beyond the borders of Canada. In the long term, the contribution of this research may influence employers to more effectively reward employees by linking salaries/income to the individual's output of human capital (research output). This is to say, provide Inducements coupling income to human capital can help nurture, foster and improve an individual's human capital stock. The study is more relevant to knowledge-intensive industries, as opposed to performance-based manufacturing and retail industries. Though this may come to fruition in the long term, continuous research will have to be conducted into the value of human capital. First, research will have to be carried out in other countries, and second, research will have to be conducted across different times, especially in a rapidly changing economic environment.

Regardless of how conclusive the results are in proving that an academic's research output is reflected in an academic's income and the impact the research has on the wider community, there remain limitations to the current study. The main limitation of this study is the sample size, as a reflection of the population. The exclusion of those academics outside of management, accounting and finance and those without current ResearchGate accounts provide the major limiting factors. These exclusions remove a big portion of the population. Thus, the characteristics of the sample may not accurately reflect the characteristics of the population. Moreover, the human capital considered in this study was that of an academic's research output, while, in fact, an academic's salary may be influenced by their teaching output and their past academic/industry experience as well, which were not factored into in the current study.

Lastly, human capital has its unique features that makes it applicable to studying the relationship between human capital and salary in universities. The main service provided by universities is knowledge and knowledge transformation from tacit to explicit knowledge. As stated in Miller (1960), the above relationship may not apply to other professions such as that of a salesman which values skills of entrepreneurship and creativity. These skills cannot be applied to a relationship where a higher level of education and more work experience results in higher wages. The labour market for academics is not a fully free market. It has a high barrier to entry. However, we feel that since we are limiting our analysis to a single industry, we are controlling for this aspect of employability in universities in our econometric analysis.

In response to the above limitations, future research should include proxies reflecting academics teaching expertise, postgraduate supervisory roles, education and work experience. Additionally, proxies used in the current study could be measured differently. The rankings associated with publications can reflect the contribution and impact score associated with them. Moreover negative measures of human capital can be utilised. Furthermore, the current research was undertaken in the Canadian academic context, specifically in the Province of Ontario. This research needs to be conducted in other countries to better understand the relationship between human capital and remuneration,

and arrive at generalisable conclusions. A positive relationship may only exist due to the perspectives of Canadian employers and country-specific differences among other factors. The positive relationship between human capital and salary will be heavily influenced by the policies of Universities and is likely to be influenced by Canadian universities heavily prioritising research in academic success, as outlined in Chant (2005). This may not be the case in Universities in less-developed countries for example.

Lastly Laroche and Mérette (2000), Mulligan and Sala-i-Martin (1995) and Son (2010) all quantitatively carried out research into the cross-country domain, while nation-specific human capital has simultaneously been qualitatively researched by Schultz (1961) and Lucas (1988). Similarly, quantitative and qualitative research has been done on firm-specific human capital, as portrayed in the studies by Neal (1995) and Coff and Raffiee (2015). Future research needs to answer the research question:

*RQ1.* Why is there a positive relationship between an individual's human capital and their remuneration?

A qualitative approach may be better suited to analysing the value of human capital due to the difficulties in measuring human capital quantitatively.



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