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Influence of Intellectual Capital on Financial Performance of Power & Energy Sector Companies in Sri Lanka

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The purpose of this research is to determine the impact of intellectual capital on the financial performance of power and energy companies in Sri Lanka adopting key dimensions; human capital efficiency, structural capital efficiency, relational capital efficiency, and capital employed efficiency. Additionally, this study investigates any other sector-specific factors that influence the performance of the power and energy sector in Sri Lanka. To achieve the study's goal, a quantitative approach and general qualitative analysis were used. The value-Added Intellectual Coefficient method was used for quantitative analysis and secondary data were gathered from a published database of annual reports from the power and energy sectors spanning the years 2011 to 2020. All firms in the power and energy sector listed on the Colombo Stock Exchange, as well as all government sector organizations in the selected sector, Ceylon Electricity Board, LECO, and Petroleum Corporation, are considered. Furthermore, an interview approach was used to explore the factors influencing the overall performance of the power and energy sectors in Sri Lanka, and the data were analyzed using qualitative data analysis techniques. Quantitative analysis revealed that capital employed efficiency has a positive effect on and is significant for all dependent variables, such as return on assets, return on equity, and asset turnover. Furthermore, human capital efficiency is positively affected for all dependent variables and is a significant predictor of asset turnover and return on assets. Further analysis reveals that structural capital efficiency has a positive effect on return on assets and return on equity, but it is insignificant for all returns on assets, return on equity, and asset turnover. Further qualitative investigation reveals that human capital efficiency, structural capital efficiency, relational capital efficiency, and capital employed efficiency are all critical to improve the organisation's financial and overall performance. As sector and context-specific factors, it was discovered that political influence, weather conditions, government decisions, and pricing formulas that have not been developed to allow for cost-reflective pricing even though it has a direct impact on a firm's financial and overall performance. The paper represents to fill the gap in the literature relating to the relationship between intellectual capital and a firm's financial performance in power and energy sector companies in Sri Lanka. Findings help to provide solid recommendations for the importance of intellectual capital in the growth of this sector. Further, the paper attempts to identify other factors which affect the finance and overall performance of power and energy sector companies in Sri Lanka which can be considered for due attention in strategic decision making.

Keywords: *Intellectual Capital, Firm performance*

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Introduction

A firm's value is improved by knowledge development from tangible assets to intangible assets. Therefore, as intangible assets, the importance of intellectual capital is crucial to firm performance, which ultimately affects the whole economy. In the modern environment, increasing the value creation of firms is moving towards intangible assets. Intellectual capital is considered an asset and is broadly defined as the collection of informational resources a company has at its disposal that lead to gaining profits, new customers, creating new products, and improving the business. It consists of employee expertise, organizational processes, and other intangibles that contribute to a company's bottom line. Similarly, intellectual capital is generally considered as the collection of all informational assets of the organization to drive profits, increase new clients, make new products, and improve the business, thus considered a resource. It is the entirety of worker expertise, organizational processes, and other intangibles that contribute to a company's bottom line. Professionals, academicians, and analysts consider intellectual capital as a key determinant in increasing the value creation process and firm performance of the organization. Further many research fields have discussed the importance of intellectual capital in firm performance.

In 2018, Chowdhury, Rana, Akter, & Hoque mentioned that intellectual capital plays a vital role in firm performance around the world and can be considered an intangible asset that creates competitive advantages for an organization by being associated with its resources. Bhasin & Shaikh (2011), highlighted that capital, land, or equipment are no longer the drivers of the future, but the ‘people" and their "knowledge" are the drivers. In recent years, intellectual capital has become one of the most important areas in the field of accounting and finance. In a developing economy, intellectual capital has been considered an important resource that is critical to enhance the firm performance and obtaining competitive advantages. It is needed to invest in intellectual capital and use it efficiently to offer high-value products and services (Xu & Li, 2020). For an economy to operate and grow, it requires a sound and healthy financial system. The sole basis is that the balance sheet items do not create value. Haris, Yao, Tariq, Malik, & Javaid (2019) explained that information, knowledge, intellectual property, expertise, systems, and processes are considered non-balance sheet items and have a significant value-creation impact on value creation. Furthermore, previous literature mentioned that intellectual capital is not clearly listed on the balance sheet and it has a significant impact on overall business performance and success. (Mondal & Ghosh, 2012).

In this competitive environment, asset growth and increasing profitability are not enough for survival. The emphasis on the productivity of assets, the efficiency of capital, and revenue growth needs to be considered. As Mondal & Ghosh, (2012) emphasized, intellectual assets such as information technology and knowledge management are employed in the banking industry in a variety of ways to reduce costs and increase efficiency and innovative activities. Further, intellectual capital is vital for the success of all types of industries, like agriculture, manufacturing, and service industries (Weqar et al., 2020). By supporting the above ideas, Xu and Liu (2019) stated that with the emergence of new economic forms, the competition pattern of companies has changed from capital-led to knowledge-led. What contributes the most to companies is no longer tangible physical capital but intellectual capital made up of intangible assets. Intellectual capital helps not only companies to obtain sustainable competitive advantages but also assists in improving corporate performance and value creation. In line with ideas highlighted by Bhasin & Shaikh (2011), Arslan and Zaman (2014) mentioned that the growing importance of intellectual capital in all sectors of the economy has led to new directions in the knowledge-based economy, especially in the oil and gas sector. Further, intellectual capital collectively refers to all intangible resources that lead to the value of the organization and competitiveness. Energy is considered an important factor for social survival and economic development.

Emerging economies are considered global dependencies because they are still in the initial development stages and because the power and energy sectors are considered the most important for economic growth. As a developing country, the energy sector in Sri Lanka has been considered a significant leader in industrial growth over the past period by supplying energy to power the economy. Energy is a key source of economic growth and is considered the main input for many production and consumption activities. For economic development, energy is considered one of the most important inputs in Sri Lanka. As a developing country, Sri Lanka requires intellectual capital to achieve economic development. It brings benefits and advances to the economy and is considered the power to sustain organizational performance and to become more competitive in the marketplace. Power and the energy sector are considered knowledge-based and technology-based sectors, and intellectual capital is more important for creating knowledge and innovations. As Wijaya & Gurendrawati (2020) revealed generally, energy is one of the significant industry sectors that affect the company's production and the economic output of a country. Economic growth will highly depend on the adequacy of energy availability. The production process of goods and services will always need the support of energy supply. In addition, Arslan & Zaman (2014) explicate that in organizations like the energy sector, intellectual capital is considered the main driver of growth and value creation and is considered a competitive advantage in a knowledge-based economy. Intellectual capital has been used as intangible and knowledge-based assets. A sustainable firm’s performance and its competitive advantage are mainly linked to intangible and knowledge base assets that mean with the intellectual capital of the firm.

Sri Lanka aims to become energy self-sufficient by 2030 as per the energy sector development plan (2015-2025). The plan also envisages increasing the portion of electricity generation from renewable energy sources from 50% in 2014 to 60% by 2020 and finally meeting the total demand through renewable and other native energy resources by 2030. (Ministry of Power & Energy, Sri Lanka Energy Sector Development Plan for a Knowledge-Based Economy 2015 - 2025). In the past period, energy generation has increased from 11,528Gwh to 15,714Gwh from 2011 to 2020, and the performance of the energy sector has increased (Annual Report 2020, Central Bank of Sri Lanka). The Ceylon Electricity Board, which is the main state

organization in the power and energy sectors, indicates the investment requirements for power generation to be $2,400 million from 2020–2025. At present, capacity shortages and delays in the implementation of mainstream power plants, slow growth in renewable energy development, and a severe financial crisis are considered the three major constraints in the electricity industry. (Sri Lanka energy sector assessment, strategy, and road map, 2019). The present situation increases the importance of intellectual capital in the power and energy sectors in Sri Lanka. Given that knowledge and intellectual capital are the primary resources of firms and play the most important role in the firm's value creation process, it is necessary to investigate intellectual capital efficiency across sectors and assess the relationship between intellectual capital components and firm performance and explore the factors that affect the financial performance of Sri Lanka's power and energy sector.

Research Gap and Research Problem

Research Gap

The energy sector is considered a knowledge- and technology-intensive sector and more concerns in intellectual capital are required. As Liu et al. (2021) mentioned, in the knowledge era, intellectual capital is counted as the primary source of competitive advantage and financial sustainability, which has drawn the attention of many researchers. Furthermore, renewable energy is a knowledge- and technology-intensive industry and effective intellectual capital utilization are critical. Green innovation, requires organizations to perform technological innovation activities. Additionally, green innovation in the renewable energy sector which can reduce greenhouse gas emissions and the cost of renewable energy, which leads to achieving economic development, and creating a sustainable society. (Liu et al. 2021). It requires more consideration of intellectual capital since it is important to power and the energy sector. Small hydropower development alone has reached new heights in Sri Lanka today, opening the door for replication of the achievement in other parts of the world. On the African continent, in consulting, project development, and implementation, the leading hydropower businesses are very active. The country has developed a vast human resource base with the full set of skills required to develop small hydropower anywhere in the world (http://www.energy.gov.lk/index.php/en/renewable-energy/economic-benefits). Further, human capital is one of the components of intellectual capital, which is the main body of technological innovation for renewable energy companies. The quality of human capital determines corporate performance (Xu and Liu, 2019). Zhu et al. (2019), mentioned that investment in R & D, which is one component of structural capital, is positively related to the financial competitiveness of China’s new energy listed firms (as cited in Liu et al., 2021). Further they have raised an important point that human, structural, and relational capital exert a significantly positive impact on financial competitiveness in renewable energy companies listed on the Shanghai and Shenzhen stock exchanges over six years. Structural Capital is the most influential contributor to the financial competitiveness of renewable energy companies and previous research findings highlighted the importance of the intellectual capital component in the development of the energy sector.

In line with the previous ideas, Liakhovych et al. (2021) stated that there is a need to develop digital skills in energy company employees through the development of appropriate training programs to ensure the operation of smart grids. Furthermore, Edziah et al. (2021) discussed how human capital can improve energy efficiency and how one important externality of human capital development is that it promotes a greener future through energy conservation, asserting that human capital development should be prioritized to promote energy efficiency and a green future. Intellectual capital creates a competitive advantage for any business, and researchers have found several sensitive components based on previous research findings. Those are human capital, structural capital, and relational capital. Energy is required for every aspect of life, and it plays a key role in the development of the country. Sri Lanka needs to use energy efficiently to be advantageous in the global competition and ensure sustainable development. Energy development is a key area in enhancing economic development. The fact that extended provision and use of energy services are powerfully associated with economic development and energy is a fundamental factor in economic development. The energy sector in Sri Lanka has been considered an important driver of industrial growth over the past century, providing fuel to power the economy.

Power and energy are knowledge and technology-intensive industries that require intellectual capital to grow in the long run. Intellectual capital helps stimulate ideas and advance procedures and systems in the energy sector by generating and transmitting energy-related products to different stakeholders. The concept of intellectual capital helps stimulate innovative ideas and advanced procedures and systems in the energy sector of Malaysia by generating and transmitting energy-related products to different stakeholders. (Asif, Ting & Kweh, 2020). The effective management of intellectual capital is important for renewable energy companies. One of the components of intellectual capital is human capital, which is the main source of technological innovation for renewable energy companies. The quality of human capital determines the enterprise's innovation. Therefore, corporate performance can be enhanced by improving the quality of human capital (Xu and Liu, 2019). The scope of most previous studies in the area of intellectual capital has been limited to either one country or an industry. There has not been much research on the impact of intellectual capital on the financial performance of the power and energy sectors, and it has mostly focused on the impact of intellectual capital on the financial performance of the power and energy sectors, capital on firms’ performance in the manufacturing sector, insurance sector, and finance sector in Sri Lanka. As a result, research is being conducted to determine the impact of intellectual capital on financial performance and to explore other factors affecting financial and overall performance in Sri Lanka's power and energy sector.

Consequently, these research findings can be used as an initial point to better understand the significance of intellectual capital and for policymakers and managers to understand the importance of the intellectual capital and their interactions to

improve firm performance, and thus develop more effective strategies to efficiently manage intellectual capital resources to gain competitive advantages. The researcher is concerned about researching since there are few reaches in this area and the significance of intellectual capital in the power and energy sector, Sri Lanka. Furthermore, previous research findings are not in line with each other. Previous research found intellectual capital has a significant positive relationship with the growth rate and future performance of firms. Nadeem (2016) measures the empirical relationship of intellectual capital with the present and future performance of firms using the VAICTM model. The research shows that intellectual capital has a significant positive relationship with the growth rate and future performance of firms. Further, the empirical relationship of intellectual capital with a bank's performance was examined and found that human capital, structural capital, and relational capital have substantive relationships with a bank's performance. Whereas Cabrita and Vaz (2005) highlighted that intellectual capital is considered a key pointer for measuring the value creation efficiency of banks (as cited in Arslan & Zaman, 2014).

Many academicians and researchers consider intellectual capital as the main determinant for improving value creation and firm performance. The empirical literature reveals that intellectual capital has a positive and significant impact on the future performance of firms. In addition, it was found that 80 percent of efficiency in VAIC performance is attributed to human capital efficiency based on research measuring the intellectual capital efficiency of Malaysian commercial banks based on VAIC assessment. Arslan and Zaman's 2014 study analyzes VAIC performance and the intellectual capital components of human capital efficiency, structural capital efficiency, and capital employed efficiency, as well as their relationships with financial performance indicators such as return on assets, earnings before interest and tax, and sales volume, using the value-added intellectual coefficient (VAIC). The results differ from those of Britto et al. (2014) and Shiu (2006), who showed a negative link between intellectual capital and company performance. (Britto et al., 2014; Shiu, 2006 as cited in Vo and Tran, 2021). Further, among the VAIC components, researchers found a positive impact of capital employed efficiency and human capital efficiency on profitability and a negative impact of structural capital efficiency on profitability. In Pakistan, researchers also observed a U-shaped relationship between intellectual capital and profitability (Haris et al., 2019). Further, Chan (2009) and Firer and Williams (2003) revealed that there is no link between intellectual capital and company performance (as cited in Vo & Tran, 2021). However, Zenopoljac et al. (2016) found that there is no significant relationship between intellectual capital and financial performance in the ICT industry (Xu and Li, 2020).

The findings on the influence of intellectual capital on firm performance are not consistent. Hence, it is not known whether and how intellectual capital impacts firm performance in the context of power and energy companies in Sri Lanka, leading to a research gap. Relationships with customers, suppliers, and stakeholders that influence the company's life can be defined as relational capital. Competitive advantages are important to increasing corporate performance, and for that, customer relations are a crucial factor (Arslan & Zaman, 2014). With this component identification and justification, the researcher has chosen each sub-component to use in this research study. These elements have significant impacts on various industries, and to develop the energy sector, it is critical to recognize the value of intellectual capital. Furthermore, to realize the benefits for businesses, it is important to identify which dimensions have an impact on the intellectual capital in the power and energy sector. Researchers have identified several sensitive factors that have an impact on intellectual capital. However most of them are not related to the power and energy sector. It is important to identify their relationship and impact on intellectual capital. The researcher has found no previous studies that are related to the current study in the power and energy sector in the Sri Lankan context.

Research Problem

The power and energy sector in Sri Lanka is an important driver of industrial growth and has been considered an important driver of industrial growth over the past century, providing fuel to power the economy. Energy is considered a basic input for many production and consumption activities. Energy is considered one of the most important inputs for economic development. Growth in the energy sector directly causes growth in GDP in Sri Lanka. Furthermore, the power and energy sectors are considered knowledge- and technology-intensive sectors and human capital is the main component of intellectual capital, which is a key factor for technological innovation. Moreover, the conclusions of previous studies are not in line with each other; one found a positive relationship between intellectual capital and firm performance, which does not agree with other conclusions that found the existence of a negative relationship. Furthermore, the electricity industry faces three major constraints: delays in the implementation of mainstream power plants; slow growth in renewable energy development; and a severe financial crisis that necessitates improved financial performance.

The identified research gap leads to research on the problem of whether and how intellectual capital impacts firm performance in the power and energy sector, which is considered the most important sector in Sri Lanka and leads to the economic growth of the country because a strong business company system in the country is the key factor in generating employment, GDP and other economic benefits for the whole country**.** The identified research gap leads to research on the problem of whether and how intellectual capital impacts firm performance in the power and energy sector, which improves the financial performance of the power and energy sector in Sri Lanka and finally the economic growth of the country because a strong business company system in the country is the key factor in generating employment, GDP, and other economic benefits to the whole country.

Research Questions and objectives

Research Questions

The main research question which is going to be answered in this research paper is: what is the impact of intellectual capital efficiency on the financial performance of the power and energy sectors in Sri Lanka?

The researcher conducted the research to answer the following sub-questions based on the main question.

- What is the impact of human capital efficiency on the financial performance of the power and energy sectors in Sri Lanka?
- What is the impact of structural capital efficiency on the financial performance of the power and energy sectors in Sri Lanka?
- What is the impact of relational capital efficiency on the financial performance of the power and energy sectors in Sri Lanka?
- What is the impact of capital employed efficiency on the financial performance of the power and energy sectors in Sri Lanka?
  and
- What other factors influence the financial and overall performance of the power and energy sectors in Sri Lanka?

Since the significance of intellectual capital in the power and energy sector and few researches done in this area, the researcher is concerned to do the research. Further, the findings on the influence of intellectual capital on firm performance are inconsistent, and it is not known whether and how intellectual capital impacts firm performance in the context of power and energy companies in Sri Lanka, and this leads to a research gap.

Objective of the Research

Sri Lanka is on the way towards becoming an internationally competitive middle-income country. The energy sector in Sri Lanka has been considered an important driver of industrial growth over the past century. The vision of the power and energy sector is to capture the full potential of all renewable and other indigenous resources for Sri Lanka to become a nation self-sufficient in energy. The Ceylon Electricity Board, which is the main state organization in the power and energy sectors and plans, indicates the investment requirements for power generation to be $2,400 million from 2020–2025. The findings of this research serve as a useful input for power and energy sectors to apply their institutions and in addressing the factors affecting intellectual capital performance to maximize their value creation and financial performance. The financial crisis is a huge problem among major constraints in power and the energy sector. It is important to study the ability of increased firms' financial performance to overcome the financial crisis through the improvement of intellectual capital and, by that, improve sustainable economic growth. The main objective of this study is to find out the impact of intellectual capital efficiency on the financial performance of the power and energy sectors in Sri Lanka to improve the value creation process in the present financial crisis. The sub-objectives are,

- To identify the impact of Human Capital Efficiency on the financial performance of the power and energy sector in Sri Lanka
- To identify the impact of structural capital efficiency on the financial performance of the power and energy sectors in Sri Lanka.
- To identify the impact of Relational Capital Efficiency on the financial performance of the power and energy sector in Sri Lanka
- To identify the impact of Capital employed Efficiency on the financial performance of the power and energy sector in Sri Lanka and
- To identify other factors, that influence the financial and overall performance of the power and energy sectors in Sri Lanka?

Literature Review

A firm's strategic management depends heavily on intellectual capital. Because of its features, such as being valuable, scarce, inimitable, and non-substitutable, intellectual capital is considered the primary resource (Asif et al., 2020). A brief review of contemporary research indicates that intellectual capital has been used as an intangible and knowledge-based asset. Therefore, sustainable firm performance and competitive advantages are mainly associated with these knowledge-based assets, the firm’s intellectual capabilities and resources, which are jointly referred to as intellectual capital (Bontis, 1998, 2001; Wu et al., 2006 as cited in Arslan & Zaman, 2014). Furthermore, a wide analysis of the literature identifies three major components of IC: human capital, structural capital, and relational capital (Chowdhury et al., 2018). Human, structural, and relational capital, collectively known as intellectual capital, are the foundations of a company's success and competitiveness. It reflects the knowledge, skills, competencies, education, relationship abilities, and values of the employee (Chowdhury et al., 2018). As in human theory, firm employees are its most important assets, and it emphasizes the need to develop them for

improved productivity, growth, and survival of the organization (Olohunlana et al., 2022). Furthermore, traditional accounting ignores the role of human capital, which misleads stakeholders and decision-makers. (Grant, 1996; Stewart, 1997; Bontis, 2001 as cited in Smriti & Das, 2018).

Further, patents, copyrights, rules, procedures, and decision-making policies of the organization are considered as non-human assets and considered structural capital, and investment in this capital will enhance performance. (Daum, 2003 as cited in Olarewaju & Msomi, 2021). Relational capital contributes to the development of external stakeholders' relationships, including trust, experience, and knowledge. The intellectual capital prevents stakeholders like customers from leaving the profitable relationship (Subramaniam & Youndt 2005 as cited in Olarewaju & Msomi, 2021). According to Williams & Kelechi, (2021), manufacturing firms are involved in different means and processes of production as technology evolves, and intellectual capital has been recognized as a key resource and driver of organizational performance and value creation. They underlined that with the change in the global business world to a knowledge-based economy, intellectual capital is considered an important factor for organizations to survive in business in this complex and energetic world. According to (Rahimpour et al., 2020) most practitioners, academicians, and researchers' intellectual capital is considered a key determinant to improve value creation efficiency and firm performance**.** They investigated and highlighted the increasing importance of intellectual capital in all sectors of the economy, particularly in the oil and gas sector, and that as a developing country in Pakistan, intellectual capital plays an important role in increasing GDP. Asif et al. (2020) mentioned that intellectual capital is considered to play a crucial role in a firm's strategic management. It is considered the primary resource due to its features of being valuable, scarce, inimitable, and non-substitutable. As Asif et al. (2020) mentioned, the International Integration Reporting Council, the firm's value is formed through its external environment, relationships, and various resources. In a successful strategy in an organization, a firm's products, people, environment, and processes play a vital role. Additionally, the integration competencies of an organization's staff and, its internal and external structure are considered intellectual capital and are not presented in financial statements and are considered as a hidden value. That is the value difference between the book value and the market value of the firm. (Chowdhury et al., 2018). In addition, intellectual capital is considered as one of the key factors in the market which promotes growth and competitiveness (Lamond et al., 2010 as cited in Olarewaju & Msomi, 2021). Meanwhile, firm performance is classified into three categories: operational performance, business performance, and financial performance (Bollen et al., 2005 as cited in Smriti & Das, 2018). Additionally, the managing of intellectual capital in a well-organized manner will not only raise the organization's worth, but also increase their expertise in the financial market (Nazir et al., 2020). Knowledge management and intellectual capital are critical for the proven growth of many organizations. For stock and stakeholders, it is vital to effectively manage the intellectual as well as knowledge base resources (Boedker et al. 2005, as cited in Arslan & Zaman, 2014)

Physical assets such as equipment, materials, and plants are the main factors in the previous and which make up the mainstream of a company's worth. In the latter, awareness, understanding, experience, and the approach of workers play a more important role in the development of the company (Nazir et al., 2020). As Stewart and Ruckdeschel (1998), mentioned, intellectual capital is defined as knowledge that transforms materials into more valuable ones through the value of employee talent, proprietary knowledge, and processes, and relationships with customers and suppliers (Rahimpour et al., 2020). Intellectual capital is defined within the bounds of resource-based theory and it is categorized into three components: human, structural, and relational capital (Roos et al., 2005 as cited in Molodchik et al., 2012). Other than that, Wood (2003), Hazlina, and Zubaidah (2008) mentioned that the future performance and profitability of the firm depend on intellectual capital and the abilities of human intellect rather than physical and tangible assets (Arslan & Zaman, 2014). In addition to that, Asif et al. (2020) mentioned that intellectual capital leads to the innovation and growth of firms, and larger investment in intellectual capital resources serves firms towards longevity. In this way, firms get benefits by building a good reputation among their competitors, acquiring new knowledge by developing collaborations, and confirming the firm's value creation. Additionally, human and physical capital are the main sources of a firm's wealth creation and the profitability of firms is mostly due to the intangible resources of an organization in the energy sector. Further, the company's development pattern has changed from being capital-driven to knowledge-driven. Investment in research and development has a significant positive impact on the financial competitiveness of new energy companies in China, and physical capital has no significant impact on financial competitiveness (Liu et al., 2021).

Components of Intellectual Capital

Intellectual capital is divided into three major components: human capital, structural capital, and relational capital.

Human Capital

Human capital is an important and vital resource. It has a significant commitment to invention and innovation. In this manner, its significance within the knowledge- based economy cannot be neglected. There has been a developing consideration that labour is considered as a basic asset for an organization to success and survive, which provides the basis for competitive advantage in the business environment. These are the top management intellectual abilities of organizations being used for making strategic decisions. Knowledge, experience, skills, and expertise of firms' employees are considered human capital. (Edvinsson & Malone, 1997, as cited in Arslan & Zaman, 2014). Human capital consists of the skills, capabilities, experience, and expertise of employees gained through experience, and training (Ahangar, 2011 as cited by Smriti & Das, 2018). When an employee leaves a job, he brings his previous experience with him (Spender, 1996; Roos et

al., 1997 as cited in Smriti & Das, 2018). Furthermore, Cater & Cater (2009) stated that human capital consists of employees' skills, knowledge, and energies and is retained with employees when they leave the firm, and these intangible assets cannot be retained with the firm (as cited in Nadeem 2016). In an organization, the ability of employees is considered human capital and it can be improved with the assistance of the training. Other aspects of human capital include capability and proficiency, which can be determined through various training programs (Nazir et al., 2020).

As Nadeem (2016) pointed out, loyalty, employee professionalism, personal traits, and experience are retained with emplo yees when they leave the organization and they do not retain with the organization. Furthermore, it includes creativity, teamwork, an affirmative working environment, and know-how are able to be shared between employees. This human capital contributes towards the firm's tangible and intangible assets and can be further improved by training. In terms of profitability, human capital aims at value addition to the organization and when employees possess innovative skills, they contribute to decision making towards organizational efficiency and effectiveness in many ways (Luthans & Youssef, 2004 as cited in Nadeem, 2016). Previous literature mentioned that human capital is mainly based on the knowledge, abilities, talent, know-how, skills, experience, and education of individual employees in the organization, and organizational capital is based on systems, guidelines, processes, structures, procedures, and rules of organizations (Azlina et al., 2017). Since a knowledgeable, flexible, and well-trained workforce enhances the competitiveness of an organization, the quality of human resources is a primary concern in emerging countries (Smriti & Das, 2018)**.** As in Azlina et al. (2017), capital framework, education, skills, and human capital are interchangeable concepts, and education is the most important component of human capital. In addition, education is the only one way to develop skills; other methods, such as 'learning-by-doing' and on-the-job training, are required. Skill can describe the range of behavioral attributes such as reliability, ability to work without supervision, and stability of employment. Skills can be acquired through education and formal training, but mainly through learning by doing. Furthermore, education attainment can be used to measure proxies of human capital and skills. Human capital is considered the most important asset that exists within the organization. The human factor is the combination of intelligence, skills, knowledge, aptitudes, and expertise that give distinctive character. Those characters contribute to the production and profitability of the organization and thus improve organizational performance (Bontis et al., 2000; Tayles et al., 2007; Gazor et al., 2013 as cited in Azlina et al., 2017). Further, better human capital leads to proper planning, problem-solving, and troubleshooting and, thus, increases production efficiencies and enhances organizational efficiencies (Boxall, 1996; Youndt and Snell, 2004; as cited in Kengatharan, 2019). According to Ting and Lean (2009), human capital includes innovation, capacity, creativity, know-how, and previous experience; teamwork capacity; employee flexibility; tolerance for ambiguity; motivation; satisfaction; learning capacity; loyalty; formal training; and education (as cited by Azlina et al., 2017). Therefore, employees with advanced human capital are more creative and execute a variety of tasks, create effective behavior in the workplace, efficient in completion of standardized work; and they go the extra mile beyond the roles specified in the job description (Kengatharan, 2019). According to Youndt and Snell (2004), employees with significant human capital lead to a high level of productivity by controlling inputs and maximizing resource utilization, resulting in a reduction in production cost (as cited in Kengatharan,2019). According to Verbano and Crema (2013), human capital is measured through education and training, capabilities, motivations, creativity, proclivity for innovation, and internal communication and teamwork. Based on the above findings, the following hypotheses were developed.

H1. There is a significant relationship between human capital efficiency and the financial performance of the power and energy sectors in Sri Lanka.

Structural Capital

As Carroll and Tansey (2000) mentioned, structural capital is the second integral part of intellectual capital (Arslan & Zaman, 2014). It denotes technology, innovative processes, databases, patents, copyrights, and supportive infrastructure processes that enable human capital to function properly. Further, Arslan and Zaman (2014) highlighted that structural capital identifies as organizations' processes, technology, and supportive activities to link for the value creation efficiency of a firm. Therefore, it is a very key mechanism for the transmission and communication of knowledge in the internal and external environment of an organization for value creation. Structural capital is considered the glue of an organization. The value of structural capital depends on how the structural capital leads a company to package, move, and use human capital and the company's knowledge in achieving its corporate goals. Structural capital is not tangible assets, which are recorded in the books as assets. Structural capital is a company's capability to use these tools to contribute to profitability (Viorel Lefter et al., 2008). Structural capital deals with the mechanisms and structures of the organization that support employees' best intellectual performance and thereby increase overall performance (Bontis,1998). According to Bontis (1998), even if an individual has a high level of intelligence, the company's entire intellectual capital will not reach its full potential if the organization's systems and procedures are inadequate. An organization that has strong structural capital builds a supportive culture in the organization and permits employees to do things, even fail and try again and thereby increase overall performance. Further, previous literature explains that organizational capital is the institutionalized knowledge in the organization's own systems, processes, manuals, tools, structure, patents, culture, policies, etc. (Nahapiet and Ghoshal, 1998; Youndt and Snell, 2004; Youndt et al., 2004 as cited Kengatharan, 2019). Structural capital helps intellectual capital to be measured and developed in an organization. Without structural capital, intellectual capital would be nothing more than human capital, as Nike Bontis pointed out in 1998. Further, it assists in cost minimization and profit maximization per employee. Based on the above factors, the following hypothesis can be developed.

H2: There is a significant relationship between structural capital efficiency and the financial performance of the power and energy sectors in Sri Lanka.

Relational Capital

Relationships with customers, suppliers, and stakeholders that influence the company's life can be defined as relational capital. Competitive advantages are important to increase corporate performance, and for that, customer relations are a crucial factor (Arslan & Zaman, 2014). Relational capital is considered as the knowledge that is established through the firm's external relations. Relationships with agents, consumers, suppliers, competitors, partners, clients, shareholders, industry associations, members of the community, society, government, the state, and informal networks all include relational capital. (Inkinen, 2015). Furthermore, customers are seen as the primary source of increasing an organization's competency, and organizational competency is built on customer relationships (Arslan and Zaman, 2014). Relations with agents, relations with, society, relations with the government and relations with shareholders have a relationship with sales performance. As Verbano & Crema (2013) mentioned, relational capital is measured through external collaborations, customer relations, supplier relations, competitors and other relations, and reputation. Knowledge of marketing channels and customer relationships are considered customer capital. When a business exceeds the demands and wants of its clients, it becomes a leader rather than a follower. It is more difficult to develop customer capital than other internal resources since it is the most external to the organization's core (Bontis, 1998). Based on the above factors, the following hypothesis can be developed.

There is a significant relationship between relational capital efficiency and the financial performance of the power and energy sectors in Sri Lanka.

Capital employed Efficiency

According to several past studies (Chowdhury et al., 2018), intellectual capital cannot function without the existence and effective use of physical and tangible capital. This implies that companies with higher capital employed efficiency provide better financial results. Furthermore, tangible capital was recognized as one of the key sources of competitive advantage. Further physical assets are referred to as property, plant, and equipment and are used for the production or supply of goods and services, for rental to others, or for administrative purposes (Chukwu & Egbuhuzor, 2017). Based on the above factors below hypothesis is developed.

H4: There is a significant relationship between capital employed efficiency and the financial performance of the power and energy sectors in Sri Lanka.

The evolution of intellectual capital is based on theories such as the resource-based theory, and resource dependency theory, which focus on the importance of not only tangible but also intangible assets for modern firms. As mentioned, by Nadeem (2016), intellectual capital is based on theories of resource-based theory, resource dependency theory, and Organizational Learning (OL) Theory which focus on tangible and non-tangible assets. These theories can be used to link intellectual capital resources with the financial performance of firms (Nadeem, 2016)**.** According to Verbano & Crema, (2013), the following measurements are used to measure intellectual capital under each dimension:

Formulation of Hypotheses

Based on the above discussion, the study intends to propose the following hypotheses:

H1: There is a significant relationship between human capital efficiency and the financial performance of the power and energy sectors in Sri Lanka.

H2: There is a significant relationship between structural capital efficiency and the financial performance of the power and energy sectors in Sri Lanka.

H3: There is a significant relationship between relational capital efficiency and the financial performance of the power and energy sectors in Sri Lanka.

H4: There is a significant relationship between capital employed efficiency and the financial performance of the power and energy sectors in Sri Lanka.

Research Methodology and Research Design

Research Methodology

Both quantitative and qualitative data collection methods were used to determine the impact of intellectual capital efficiency on firm performance and to investigate other factors influencing the financial and overall performance of Sri Lanka's power and energy sector. A quantitative study was conducted using secondary data. The objectives were aligned with the methodology. This research used all power and energy sector companies listed on the Colombo stock exchange and all government sector organizations for 10 years. The practical data was gathered from annual reports published between 2011 and 2020, and the analysis was carried out using the Eviews package. The researcher used an interview survey as a qualitative method, and data were analyzed using thematic analysis. The findings of this study are useful input for the power and energy sectors in applying their institutions and addressing the factors affecting intellectual capital performance to maximize their

value creation and financial performance. The financial crisis is one of the most serious constraints on the power and energy sectors. It is critical to investigate the ability of firms to improve their financial performance to overcome the financial crisis and, as a result, improve long-term growth. Further, the primary objective of this study is to determine the impact of intellectual capital on the financial performance of the power and energy sectors in Sri Lanka, as well as to investigate factors that influence financial performance to improve the value creation process during the current financial crisis. Further, policymakers and corporate managers can use these findings as a starting point to better understand the significance of intellectual capital components and their impacts on firm performance, and thus develop more effective strategies to efficiently manage intellectual capital resources to gain competitive advantage.

This served as an introduction and background for the thesis. The research problem was outlined, followed by the research objectives. The research methodology and the thesis's contribution were briefly discussed. The researcher used quantitative method to answer first four questions and researcher further used qualitative method to rationalize the findings gathered from quantitative analysis and to answer last question to explore the other factors affecting the firm financial and overall performance of power and energy sector companies in Sri Lanka. As discussed, the purpose of this study is to examine the relationship between intellectual capital and business financial performance. The current study measures the variables using a monetary measure, i.e., the VAIC model to calculate intellectual capital efficiency and quantitative performance measures such as return on assets, return on equity and asset turnover using annual report data. The secondary data is used in this empirical study and collects data from the published database of annual reports of power and energy sectors over the ten-year period from 2011 to 2020.

Calculation of VAIC

This section describes in detail how the VAIC model works and the steps involved in VAIC calculations. The VAIC calculations are two step process, with the first step of calculating value added and the second calculating VAIC. The purpose of the research is to evaluate the influence of intellectual capital on financial performance indicators in the power and energy sectors in Sri Lanka. Value addition can be calculated by adding back non-cash expenses such as depreciation, amortization, and employee costs to operating profit before interest and tax (Pulic, 1998; Puntillo, 2009 as cited in Chowdhury et al., 2018). The VAIC method is considered the most appropriate approach for the purpose of intellectual capital measurement (Joshi et al., 2013 as cited in Chowdhury et al., 2018). Vishnu & Gupta (2014) developed another modified VAIC model, including Relational Capital as the new Intellectual Capital component. Marketing, selling, and advertising expenses were introduced as the proxies for Relational Capital. Relational capital efficiency was measured as the ratio of marketing, selling, and advertising expenses to value addition (Xu and Liu, 2020). The method adopted assumes that the value addition of the firm is known based on the stakeholder theory by accumulating all value creations to stakeholders. The modified VAIC model adopted in this study is elaborated below.

$VA = P + C + D + A$

where:

VA = Value added to the company

P = Operating profits;

C = Employee costs;

D = Depreciation; and

A = Amortization.

Intellectual capital efficiency is obtained by summing up human, structural, and relational capital efficiencies.

$ICE = HCE + SCE + RCE$

Human capital efficiency

$HCE = VA/HC$

VA = Value added for the firm

HC = Total wages and salary costs for the firm; and

HCE = Human capital coefficient for the firm.

Structural capital efficiency:

As Gigante, 2013, the structural capital employee ratio implies that each unit of money invested in structural capital contributes to value addition in the organization. (as cited in Chowdhury et al., 2018). SC = VA– HC – Marketing, selling and advertising expenses.

$SCE = SC/VA$

where:

VA = Value added for the firm;

SC = Structural capital for the firm; and

SCE = Structural Capital Efficiency (Structural capital VA).

Relational Capital Efficiency

RC = Marketing, selling and advertising expenses

RCE=RC/VA

Capital employed efficiency

This refers to the contribution made by each unit of capital employed (CE) to value addition in the firm. All the physical and material financial assets of the firm that are referred to as capital (Gigante, 2013 as cited in Chowdhury et al., 2018b).

CE = TA - CL

CEE = VA-CE

where:

VA = value added of the firm;

CE = Capital used of the firm;

CEE = Capital used efficiency coefficient of the firm;

TA = Total assets (excluding goodwill and intangibles); and

CL = Current liability

Furthermore, value added intellectual coefficient (VAIC) = ICE+CEE

where:

ICE = Intellectual Capital Efficiency.

CEE = Capital Employed Efficiency

The Modified VAIC indicates corporate value creation efficiency.

Variable Definitions

Dependent variables.

By analyzing contemporary research, the literature recognized the broadly used financial performance indicators as profitability indicators (ROA), return on equity (ROE); and productivity indicators, such as asset turnover (ATO).

Indicators can be defined as,

ATO = Sales/average assets

ROA = Profit after tax/average assets

ROE = Profit after tax/average common stock equity

Independent variables.

The efficiency levels, calculated in this regression model through human capital efficiency, structural capital efficiency, Relational capital efficiency, and capital employed efficiency, served as independent variables.

$$ATO = \beta 0 + \beta 1HCE + \beta 2SCE + \beta 3\ RCE + \beta 4CEE \quad (1)$$

$$ROA = \beta 0 + \beta 1HCE + \beta 2SCE + \beta 3\ RCE + \beta 4CEE \quad (2)$$

$$ROE = \beta 0 + \beta 1HCE + \beta 2SCE + \beta 3\ RCE + \beta 4CEE \quad (3)$$

Sample and Data Collection

Data Sources

The purpose of this research is to look into the relationship between intellectual capital and financial performance. Secondary data is used in this empirical study, which collects data from a published database of annual reports from the power and energy sectors from 2011 to 2020.

Population

All the firms in the power and energy sector listed on the Colombo Stock Exchange and all government organizations in the power and energy sector are considered.

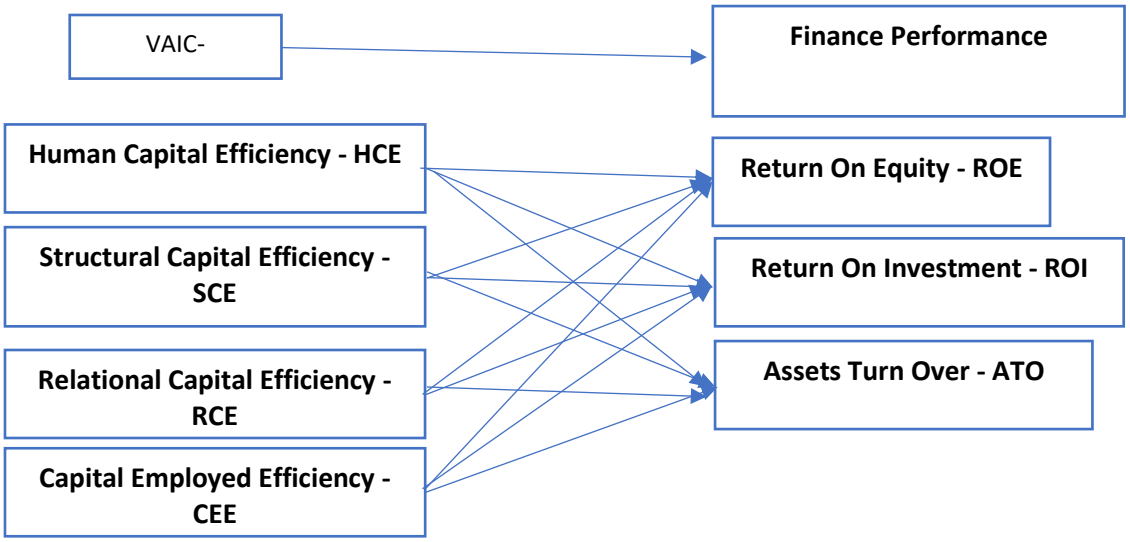
Sample

Table 1 shows the specifics of the sample chosen in the power and energy sector in Sri Lanka.

Table 1: Sample selection for quantitative approach

	Name of the Company	Nature of Business
	Power (Utility Companies)	
1	Panasian Power Plc	Produce Hydro Power and sell to the CEB
2	Resus Energy PLC	Power Generation company
3	Vallibel Power PLC	Power Generation Company
4	Vidulanka PLC	Power Generation Company
5	Lotus Hydro Power PLC	Power Generation company
6	Ceylon Electricity Board	Generation, Transmission and Sale of Electricity
7	Lanka Electricity Company	Sale of Electricity
	Energy Companies	
8	Lanka IOC PLC	Energy Company
9	Laugfs Gas Company	Energy Company
10	Ceylon Petroleum Corporation	Energy Company

Conceptual Framework



Data Analysis

The intellectual capital efficiency for firms is measured through Eviews to perform both the descriptive analysis and the regression analysis. Furthermore, a fixed effect model and a random effect model are used for panel data. All diagnostic tests such as multicollinearity, heteroscedasticity, and autocorrelation tests are performed**.**

Qualitative Approach

A general qualitative analysis was conducted, and the researcher used interviews as a qualitative method to identify real perceptions of the impact of intellectual capital on financial performance in order to rationalize the quantitative findings and answer the following research questions and achieve the following goal:

Research Question

The research question addressed is, "What other factors influence the financial and overall performance of the power and energy sectors in Sri Lanka?"

Research Objective

The purpose of this study is to investigate the real perception and rationalize the quantitative approach findings, as well as to investigate other factors influencing the firm financial and overall performance of power and energy sector companies in Sri Lanka.

Method of data collection - Interviews

Interviews are one of the most important qualitative data collection methods, and they are commonly used in field studies and ethnographic research. As Qu and Dumay (2011), interviews are one of the most significant qualitative data gathering procedures, and they are commonly used in field studies and exploratory research (as cited in Mudiyanselage, 2018). Their high degree of flexibility enables the interviewer to truly understand the interviewee's conceptual categories as well as his or her interpretations of reality. Furthermore, the ability to conduct the interview based on the interviewee's responses improves understanding of the motivations that drive his/her decisions. With this method, the researcher can discover features of behavior that had previously been hidden. The objective is to gradually reveal deeper and deeper layers of managerial knowledge (Montemari & Nielsen, 2013). In conducting interviews, the researcher used an interview guide, which is shown in Appendix B. These interviews were done at the individual level since tacit knowledge is often personal (Polanyi, 1962, as referenced by Marco. Bence et al., 1995; Hussey and Hussey, 1997, as referenced by Alam, 2021).

According to Krippendorff (1980), the researchers transcribed all of the interviews in their fullness, and the researchers analyzed them using a structural coding approach, as shown in table 2 (as cited in Montemari & Nielsen, 2013). As Sekaran and Bougie (2010), when an interview is taken personally, it helps to encourage in-depth comments from respondents (as cited in Alam, 2021). This procedure assists respondents in better understanding the questions. The researcher records interviews using two methods: taking notes and audio recording. The researcher asked the respondents for permission to record the discussion through their mobile phones before beginning the interview. During the interview, the researcher first gathers and records the dialogues in a systematic manner. The interview will last approximately 25-35 minutes, and an interview guide was used to ensure the interview's proper direction. Thematic analysis was used to analyze qualitative data acquired from the interviews. Before the data is coded, the researcher transcribes it to achieve the general ideas of the explanation, correctness, data depth, and true meaning. The researcher first used the code to categorize the common theme from the transcribed interview. According to Richards and Morse (2007), coding is more than just a data analysis and data explanation process that assists the researcher in building a connection from data to idea and from idea to relationship of the research based on all of the facts (as cited in Alam, 2021). In this study, interview data was analyzed using thematic analysis. Table 2 shows the six phases of thematic analysis established by Braun and Clarke (2006).

Table 2: Steps of thematic analysis

Phase	Description of the process
1.Familiarizing yourself with your data	Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas.
2.Generating initial codes	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
3.Searching for themes	Collating codes into potential themes, gathering all data relevant to each potential theme.
4.Reviewing themes	Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (level 2), generating a thematic 'map' of the analysis.
5.Defining and naming themes	Ongoing analysis to refine the specifics of each theme and the overall story the analysis tells, generating clear definitions and names for each theme.
6. Producing the report	The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis

According to Braun and Clarke (2006), thematic analysis is a technique for detecting, evaluating, and reporting data patterns, and flexibility is the most important element of this tactic. Before conducting a thematic analysis on verbal data, such as interviews, television shows, or political speeches, the data must be transcribed into written form. (Braun and Clarke, 2006). However, after completing the general coding, the researcher determines the homogenous categories based on the study questions and discovers the correlations with the codes. Following that, interviews were conducted and transcribed to become more familiar with the data and become more involved with it. While re-listening to the recording, the transcription was double-checked to ensure that no crucial material had been missed. As Riessman (1993) even the transcription process, which is time-consuming, frustrating, and at times boring, can be an excellent way to begin familiarizing with the data (as cited by Braun and Clarke, 2006). What matters is that the transcript retains the information you require from the verbal account in a manner that is "true to its original nature."(Braun and Clarke, 2006).

The second step begins after reading and becoming familiar with the data, as well as generating an initial list of ideas about what is in the data and what is interesting about it. The data is then used to generate initial codes in this phase. As Boyatzis (1998) mentioned, codes identify a data feature that the analyst finds interesting and refers to "the most basic segment, or

element, of raw data or information that can be meaningfully assessed in relation to the phenomenon" (as cited in Braun and Clarke, 2006). The next step begins after all the data has been initially coded and collated, and have a long list of the various codes have identified across the data set. When considering the relationship between codes, the codes may go on to form main themes, while others may form sub-themes, while others may be discarded. At the end of this phase, it appears the candidate themes, as well as all data extracts that have been coded in relation to them, have been collected. During the next phase, it will become clear that some candidate themes are not actually themes, while others may integrate. Data within themes should meaningfully cohere together. There should be a good understanding of various themes by the end of this phase, how they fit together, and the overall story they tell about the data. In the next step, identifying the "essence" of each theme and determining what aspect of the data each theme captures. The researchers transcribed all of the interviews in their fullness, and the researchers analyzed them using a structural coding approach and identified themes, as shown in Table 3. At the end, it is the task of the write-up of thematic analysis.

Table 3: Themes

	Name
1	Indicators for measuring financial performance
2	Familiarizing of the word intellectual capital
3	Familiarization with the components of intellectual capital
4	Dimensions of human capital efficiency
5	Dimension of structural capital efficiency
6	Dimension of relational capital efficiency
7	Influence of intellectual capital on finance performance
8	Other factors influencing firms' financial and overall performance

Sample selection for interviews

As mentioned David and Sutton (2004) suggest that the appropriate sample size can be determined based on the researcher's experience and the resources available in terms of cost and time (as cited in Mudiyanselage, 2018), The cumulative outcome of qualitative data was used to rationalize quantitative analysis findings and identify real perception of the relationship between intellectual capital and firm financial performance, as well as to investigate other factors affecting the financial and overall performance of power and energy sector companies in Sri Lanka. Table 4 shows the results of a snowball sampling technique used to select officers for interviews. In snowball sampling, the researcher contacts informants using contact information provided by other informants. (Hogarth and Wójcik, 2016; Noy, 2008; Sumit and Kerry, 2013, as cited by Mudiyanselage, 2018). The first selection of officers was based on the researcher's own contacts as well as introductions from friends and family. An attempt was made to contact fifteen interviewees, but they did not have time during the interview period. As a result, eight interviews were conducted and transcribed in order to become more familiar with the data and more involved with it.

Table 4: Sample selected for interviews

Title	**Number of participants**
General Manager Finance	1
Chief Financial Officer	1
Deputy General Manager	1
Deputy Finance Manager	2
Accountants	2
Executive	1

The researcher used quantitative and general qualitative analysis to answer the research questions. The mixed methods research approach is widely used in social science and by management and accounting researchers. The mixed methods approach, provides researchers with a more thorough and comprehensive investigation of the phenomena than would the use of one method alone. As a result, by combining quantitative and qualitative methods, it is possible to improve the research validity. The research design of this thesis used a mix of quantitative and qualitative methods, and the research design was based on the research objectives and research questions, in which data were collected concurrently, independently analyzed, and integrated into the discussion.

Results and Analysis

Quantitative Data Analysis

The study examines the relationship between intellectual capital and business financial performance between 2011 and 2020 in order to evaluate the function of intellectual capital in Sri Lanka's power and energy sector's financial performance. A quantitative study was conducted using secondary data. This research uses all power and energy sector companies listed on the Colombo stock exchange and all government sector organizations for 10 years from 2011–2020. The practical data was collected from annual reports published from 2011 to 2020. The research method used is quantitative research methods, describing the effect of each independent variable on the dependent variable examined through the process of collecting, processing, and interpreting the data obtained using statistical analysis. The data analysis method used in this study is multiple regression of panel data with the help of Eviews software. Several tests were carried out to support the regression analysis, including normality tests, multicollinearity tests, heteroscedasticity tests, and autocorrelation tests for regression results.

Descriptive statistics

Descriptive statistics of the study are presented in Table 1. The study will commence by looking at the Value-Added intellectual capital components, as well as return on assets, return on equity, and asset turn over as profitability indicators for descriptive statistics like mean, standard deviation, and minimum and maximum values for N = 100. Descriptive statistics of all variables are shown in Table 01. VAIC has a mean value of 9.4684, suggesting that energy companies can generate an average value of 9.4684 for one monetary unit invested in intellectual capital. Energy-related businesses are proven to have higher intellectual capital performance. The average values of the performance variables under study are 0.8075 for the asset turn over (ATO), 0.05190 for the return on assets, and 0.1056 for the return on equity variables. Among the VAIC components, human capital structure efficiency has the highest mean value of 9.4684, which indicates that organizations create value through human capital. The human capital efficiency ratio is the indicator of the contribution made by every unit of money invested in human capital to the value added in the organization. The average value of structural capital efficiency and capital employed efficiency is low, about 0.7297 and 0.0955, respectively. This indicator means that the higher the percentage of spending on structural and physical capital in value added, the smaller the proportion of performance.

All components of the VAIC have a low standard deviation score, indicating that the sample values have a limited dispersion of values in proportion to the average, indicating low heterogeneity in these indicators among the entities studied. Human capital efficiency is a major component of VAIC with a mean value of 9.4684, which indicates the cruciality of human capital efficiency in value generation is found, and human capital and structural capital produced the highest contribution to the efficiency level of VAIC. The mean value of human capital efficiency and structural capital efficiency, are higher than the mean value of capital employed efficiency, which is 0.0955, implying that intangible assets are of greater importance than tangible assets that increase the firms' value creation. In line with the current findings, Bayrak-Taroglu et al., (2019) discovered that structural capital efficiency has a favorable impact on firm profitability using the VAIC model. Further Mohapatra et al., (2019) discovered that human capital has a positive and significant impact on the operating efficiency of Indian banks using the VAIC model (as cited Xu & Liu, 2020). The mean value of VAIC is 9.4684, which implies that the energy sector earns 9.4684 by placing a one-unit investment in intellectual capital. The standard deviation score is small in all components of the VAIC, which indicates that the sample values show a low dispersion of profitability values and intellectual components in relation to the average, revealing less heterogeneity in these indicators among the entities analyzed.

Table 4.1: Descriptive analysis

	HCE	SCE	CEE	VAIC	ATO	ROA	ROE
Mean	8.643206	0.729714	0.095537	9.468456	0.807493	0.051906	0.105614
Median	4.701218	0.821277	0.122603	5.659937	0.273839	0.045348	0.095137
Maximum	93.77491	2.136917	0.807408	92.44710	3.208320	0.364510	0.719654
Minimum	-37.58717	-5.483530	-2.580122	-35.75316	0.003283	-0.505047	-0.300529
Std. Dev.	16.30437	0.729234	0.387259	16.15754	0.965755	0.129585	0.160558
Skewness	2.844545	-6.264835	-5.699577	2.749214	1.381223	-1.241497	0.483725
Kurtosis	16.14748	54.51209	38.77297	15.34067	3.480351	8.598423	4.850650
Jarque-Bera	855.0917	11710.37	5873.527	760.5205	32.75771	156.2817	18.17027
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000113
Sum	864.3206	72.97136	9.553702	946.8456	80.74932	5.190641	10.56142
Sum Sq. Dev.	26317.41	52.64643	14.84696	25845.53	92.33554	1.662428	2.552093
Observations	100	100	100	100	100	100	100

After analyzing the descriptive statistics, whether the data had a normal distribution to undertake correlation analysis, was tested. A normality test was used to see if the data was normally distributed. If the data is normally distributed, a parametric

test may be used for this research. If the data is not normally distributed, this research proceeds with a non-parametric test. Parametric statistics are based on the assumption that the population from which the sample is drawn is normally distributed, while non-parametric statistics are based on the assumption that the sample is not normally distributed in the test. Therefore, the researcher ran several tests to check whether the data from this study could meet the assumptions of the multiple regression models. The tests were performed to evaluate data normality using EViews in order to ensure the approximation of data to a normal distribution. Thus, if the p-value is less than the chosen 0.05, then the null hypothesis, which is that the population is normally distributed, is rejected, and there is evidence of non-normality in the data distribution of dependent variables such as asset turnover, return on assets, and return on equity. Thus, the normality was checked after performing the trimming and winzorizing. Table 4.2 shows the achieved values of skewness, kurtosis, mean, and standard deviation for dependent variables. The probability value of the Jarque-Bera test results using residual data is greater than the test probability set, which is equal to 0.05. From this information, it can be seen that the residual data has been normally distributed, or in other words, it can be concluded that there is no normality problem in the existing data.

Table 4.2: Normality Test

	ROA_TRM	ROE_TRM	ATO_TRM
Mean	0.050267	0.09146	0.201234
Median	0.045348	0.095137	0.19518
Maximum	0.12125	0.184006	0.331058
Minimum	0.002261	0.014794	0.084385
Std. Dev.	0.03395	0.05008	0.067534
Skewness	0.456656	-0.02327	-0.07402
Kurtosis	2.142992	1.673715	1.911679
Jarque-Bera	3.267923	3.669161	2.362458
Probability	0.195155	0.15968	0.306901
Sum	2.513367	4.572994	9.45802
Sum Sq. Dev.	0.056478	0.122891	0.209801

Multicollinearity

A multicollinearity diagnostic test was run before commencing the regression analysis to see if the variables were significantly correlated. Multicollinearity is characterized by a high degree of interdependence between variables. Multicollinearity is a state of high interrelationships between variables. It is an important issue in the analysis of regression. It can have substantive effects not only on the regression models' predictive ability but also on the regression coefficient estimation and their statistical significance tests. The ideal situation would be to have a number of independent variables that are strongly related to the dependent but that have less correlation among themselves.

Table 4.3: Results of Multicollinearity

Variance Inflation Factors
Date: 05/17/22 Time: 01:27
Sample: 2011 2020
Included observations: 100

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.000182	2.641377	NA
HCE	4.60E-07	2.258967	1.759510
SCE	0.000134	2.063753	1.026012
CEE	0.000805	1.843876	1.737087

A multicollinearity test is performed to detect the linear relationship between independent variables. The close relationship between independent variables causes one of the assumptions to not be fulfilled in an effort to obtain estimators that are not biased, linear, and have minimum variants. From the multicollinearity test results on energy company data in Sri Lanka, there is no correlation between independent variables since the variance inflation factor values are less than 5. The VIF values vary between 1.026 and 1.759, so it can be concluded that from the data there are no multicollinearity problems in the analysis.

Heteroscedastic

If heteroskedasticity exists in the model, statistical procedures such as the Breusch-Pagan test will be used to overcome it. Heteroscedastic is found considering log value using the Breusch-Pagan test of the three models. Results show that the chi-square probability value is more than 0.05, which indicates acknowledging the null hypothesis; those residuals are homoscedastic. As a result, these models do not reflect heteroskedasticity.

Auto correlation

To test whether there is an autocorrelation problem, the Durbin-Watson test was used by referring to the Durbin-Watson statistic. The Durbin-Watson statistic of dependent variables is not in the range of 1.5–2.5. Then it concluded that there was an auto correlation problem and it was not desirable. A test was performed to remove auto correlation problems. The Durbin-Watson statistic tests the autocorrelation in a regression model's output and the data ranged from 1.5 to 2.5, and it confirms that there is no autocorrelation problem in the model.

Regression analysis

The findings of the panel regression model are presented in this section. The model examined the direct relationship between intellectual capital and a firm's financial performance. The poolability test was carried out to ensure that the model's parameters were accurate and trustworthy. These analyses begin by comparing the pooled fixed-effects model and OLS regression. First, perform the random effect model, and then perform the Hausman test to test whether the random effect model or fixed effect mode is more appropriate for the residuals. The Hausman test result for the return on assets is less than 0.05. Then the null hypothesis was rejected, and the fixed effect model was found to be more appropriate. Further tests are performed to decide whether the fixed effect or OLS method is more appropriate. The results demonstrate that the chi square probability value is less than 0.05, and the null hypothesis is rejected. The alternative hypothesis is accepted, and the fixed model is confirmed to be more appropriate.

The probability result of the Hausman test for return on equity is less than 0.05. Hence reject the null hypothesis and accept that the fixed effect model is more appropriate. Further tests are performed to decide whether the fixed effect or OLS method is more appropriate. The results demonstrate that the chi square probability value is less than 0.05, and the null hypothesis is rejected. The alternative hypothesis is accepted, and the fixed model is confirmed to be more appropriate.

Table 4.4: Hausman Test for ROA

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	41.700730	3	0.0000

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
HCE	0.005710	0.007469	0.000000	0.0000
SCE	0.013098	0.006590	0.000014	0.0864
CEE	0.073450	0.171907	0.000323	0.0000

Cross-section random effects test equation:
Dependent Variable: ROA
Method: Panel Least Squares
Date: 05/21/22 Time: 13:11
Sample: 2011 2020
Periods included: 10
Cross-sections included: 10
Total panel (balanced) observations: 100

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.014020	0.012350	-1.135209	0.2594
HCE	0.005710	0.000694	8.227985	0.0000
SCE	0.013098	0.010174	1.287419	0.2014
CEE	0.073450	0.030460	2.411405	0.0180

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.781813	Mean dependent var	0.051906
Adjusted R-squared	0.751719	S.D. dependent var	0.129585
S.E. of regression	0.064569	Akaike info criterion	-2.521419
Sum squared resid	0.362720	Schwarz criterion	-2.182746
Log likelihood	139.0709	Hannan-Quinn criter.	-2.384352
F-statistic	25.97843	Durbin-Watson stat	1.235752
Prob(F-statistic)	0.000000		

Table 4.5: Selection of Fixed effect or Pooled OLS

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	7.930843	(9,87)	0.0000
Cross-section Chi-square	59.907385	9	0.0000

Cross-section fixed effects test equation:
Dependent Variable: ROA
Method: Panel Least Squares
Date: 05/21/22 Time: 13:18
Sample: 2011 2020
Periods included: 10
Cross-sections included: 10
Total panel (balanced) observations: 100

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.040201	0.013479	-2.982492	0.0036
HCE	0.008039	0.000678	11.85503	0.0000
SCE	0.003652	0.011578	0.315458	0.7531
CEE	0.208894	0.028368	7.363715	0.0000

R-squared	0.602806	Mean dependent var	0.051906
Adjusted R-squared	0.590394	S.D. dependent var	0.129585
S.E. of regression	0.082935	Akaike info criterion	-2.102345
Sum squared resid	0.660306	Schwarz criterion	-1.998138
Log likelihood	109.1172	Hannan-Quinn criter.	-2.060170
F-statistic	48.56517	Durbin-Watson stat	0.909311
Prob(F-statistic)	0.000000		

Table 4.6: Hausman Test for ROE

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	15.208773	3	0.0016

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
CEE	0.223050	0.229028	0.000456	0.7796
HCE	0.000734	0.001157	0.000000	0.3553
SCE	0.014261	0.029398	0.000018	0.0003

Cross-section random effects test equation:
Dependent Variable: ROE
Method: Panel Least Squares
Date: 05/21/22 Time: 13:31
Sample: 2011 2020
Periods included: 10
Cross-sections included: 10
Total panel (balanced) observations: 100

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.067556	0.019993	3.379022	0.0011
CEE	0.223050	0.049308	4.523619	0.0000
HCE	0.000734	0.001123	0.653208	0.5153
SCE	0.014261	0.016469	0.865927	0.3889

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.627557	Mean dependent var	0.105614
Adjusted R-squared	0.576186	S.D. dependent var	0.160558
S.E. of regression	0.104525	Akaike info criterion	-1.558052
Sum squared resid	0.950508	Schwarz criterion	-1.219380
Log likelihood	90.90259	Hannan-Quinn criter.	-1.420985
F-statistic	12.21609	Durbin-Watson stat	1.322226
Prob(F-statistic)	0.000000		

Table 4.7: Selection of fixed effect or pooled OLS method for ROE

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	8.223328	(9,87)	0.0000
Cross-section Chi-square	61.555806	9	0.0000

Cross-section fixed effects test equation:
Dependent Variable: ROE
Method: Panel Least Squares
Date: 06/25/22 Time: 16:48
Sample: 2011 2020
Periods included: 10
Cross-sections included: 10
Total panel (balanced) observations: 100

Variable	Coefficient	Std. Error	t-Statistic	Prob.
HCE	0.001903	0.001107	1.719330	0.0888
SCE	0.064170	0.018897	3.395734	0.0010
CEE	0.231182	0.046302	4.992903	0.0000
C	0.020254	0.022000	0.920614	0.3596

R-squared	0.310725	Mean dependent var	0.105614
Adjusted R-squared	0.289185	S.D. dependent var	0.160558
S.E. of regression	0.135366	Akaike info criterion	-1.122494
Sum squared resid	1.759095	Schwarz criterion	-1.018287
Log likelihood	60.12468	Hannan-Quinn criter.	-1.080319
F-statistic	14.42557	Durbin-Watson stat	0.856241
Prob(F-statistic)	0.000000		

For asset turnover, the probability result of the Hausman test is greater than 0.05. Therefore, the alternative hypothesis is rejected and the null hypothesis is accepted. That is, the random effect model is more appropriate.

Table 4.8: Hausman test for Asset turnover

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	3.767027	3	0.2877

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
HCE	0.011069	0.010774	0.000000	0.2015
SCE	-0.014358	-0.011309	0.000004	0.1238
CEE	0.400594	0.385061	0.000116	0.1501

Cross-section random effects test equation:
Dependent Variable: ATO
Method: Panel Least Squares
Date: 05/21/22 Time: 17:40
Sample: 2011 2020
Periods included: 10
Cross-sections included: 10
Total panel (balanced) observations: 100

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.684023	0.051509	13.27977	0.0000
HCE	0.011069	0.002894	3.824646	0.0002
SCE	-0.014358	0.042431	-0.338377	0.7359
CEE	0.400594	0.127035	3.153411	0.0022

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.931671	Mean dependent var	0.807493
Adjusted R-squared	0.922246	S.D. dependent var	0.965755
S.E. of regression	0.269294	Akaike info criterion	0.334713
Sum squared resid	6.309180	Schwarz criterion	0.673385
Log likelihood	-3.735631	Hannan-Quinn criter.	0.471779
F-statistic	98.85454	Durbin-Watson stat	1.435399
Prob(F-statistic)	0.000000		

Table 4.9: Regression analysis for Return on asset

Dependent Variable: ROA
Method: Panel Least Squares
Date: 05/21/22 Time: 18:04
Sample: 2011 2020
Periods included: 10
Cross-sections included: 10
Total panel (balanced) observations: 100

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SCE	0.013098	0.010174	1.287419	0.2014
HCE	0.005710	0.000694	8.227985	0.0000
CEE	0.073450	0.030460	2.411405	0.0180
C	-0.014020	0.012350	-1.135209	0.2594

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.781813	Mean dependent var	0.051906
Adjusted R-squared	0.751719	S.D. dependent var	0.129585
S.E. of regression	0.064569	Akaike info criterion	-2.521419
Sum squared resid	0.362720	Schwarz criterion	-2.182746
Log likelihood	139.0709	Hannan-Quinn criter.	-2.384352
F-statistic	25.97843	Durbin-Watson stat	1.235752
Prob(F-statistic)	0.000000		

Table 4.10: Regression analysis for Return on equity

Dependent Variable: ROE
Method: Panel Least Squares
Date: 05/21/22 Time: 18:05
Sample: 2011 2020
Periods included: 10
Cross-sections included: 10
Total panel (balanced) observations: 100

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SCE	0.014261	0.016469	0.865927	0.3889
HCE	0.000734	0.001123	0.653208	0.5153
CEE	0.223050	0.049308	4.523619	0.0000
C	0.067556	0.019993	3.379022	0.0011

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.627557	Mean dependent var	0.105614
Adjusted R-squared	0.576186	S.D. dependent var	0.160558
S.E. of regression	0.104525	Akaike info criterion	-1.558052
Sum squared resid	0.950508	Schwarz criterion	-1.219380
Log likelihood	90.90259	Hannan-Quinn criter.	-1.420985
F-statistic	12.21609	Durbin-Watson stat	1.322226
Prob(F-statistic)	0.000000		

Table 4.11: Regression analysis for Asset turnover

Dependent Variable: ATO
Method: Panel EGLS (Cross-section random effects)
Date: 05/21/22 Time: 18:03
Sample: 2011 2020
Periods included: 10
Cross-sections included: 10
Total panel (balanced) observations: 100
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SCE	-0.011309	0.042384	-0.266824	0.7902
HCE	0.010774	0.002885	3.734536	0.0003
CEE	0.385061	0.126576	3.042137	0.0030
C	0.685835	0.308933	2.220012	0.0288

Effects Specification

	S.D.	Rho
Cross-section random	0.963311	0.9275
Idiosyncratic random	0.269294	0.0725

Weighted Statistics

R-squared	0.126448	Mean dependent var	0.071106
Adjusted R-squared	0.099150	S.D. dependent var	0.284858
S.E. of regression	0.270368	Sum squared resid	7.017478
F-statistic	4.632068	Durbin-Watson stat	1.274311
Prob(F-statistic)	0.004541		

Unweighted Statistics

R-squared	-0.055753	Mean dependent var	0.807493
Sum squared resid	97.48354	Durbin-Watson stat	0.091733

A regression result is obtained based on panel data regression analysis using the fixed effect method as the chosen model for return on asset. R square statistic value of 0.7818 suggests that 78.18% of the variations in the return on assets were predicted by independent variables such as capital employed efficiency, structural capital efficiency, and human capital efficiency. The probability F statistic tests whether the overall regression model is a good fit for the data and which is below 0.05 confirms that the model is a good fit for the data. Results show that human capital efficiency and capital employed efficiency have a significant effect on return on assets since the probability value is less than 0.05, while structural capital efficiency is insignificant in determining return on assets but has a positive impact on return on assets. R square statistics is 0.62, and this suggests that 62% of the variants in the return on equity were predicted from independent variables such as capital employed efficiency, structural capital efficiency, and human capital efficiency. The probability F statistic is below 0.05, confirming the model is a good fit for the data. Results show that capital employed efficiency has a significant effect on return on equity since the probability value is less than 0.05, while structural capital efficiency and human capital efficiency are insignificant in determining return on equity and have a positive impact on return on equity. Further R square statistics, which is 0.12, with a statistical significance of P 0.05, which suggests that intellectual capital used in the study explained 12 percent of the variations in the asset turnover of power and energy companies in Sri Lanka as established by random effect panel regression techniques adopted for asset turnover. Further results show that human capital efficiency and capital employed efficiency are significant variables in determining asset turn over since the probability value is less than 5% and structural capital efficiency is insignificant. The probability F statistic is below 0.05, confirming that the model is statistically significant.

Capital employed efficiency (CEE) has a positive and significant relationship with ROA and ROE, based on the coefficient values of 0.0734 and 0.385, respectively, suggesting the financial performance of power and energy companies in Sri Lanka is primarily driven by Capital employed efficiency (CEE), implying the relevance of physical capital in today's dynamic, globalized, competitive, and changing market setting. The findings are in line with resource-based theory. Further, present findings revealed that, Capital employed efficiency is the most influential contributor to firm profitability in the power and energy sectors, which supports the study of Xu & Liu (2020) in the manufacturing industry and the findings of Chukwu & Egbuhuzor (2017), whose findings showed that investments in plants and machinery are significantly and positively related to return on assets and return on equity. This means that the higher the capital employed efficiency of a power and energy sector firm is, the more profitable the firm can be. Human capital efficiency (HCE) is positive and significantly associated with return on asset (ROA) and Asset turnover (ATO). Molodchik et al. (2012) revealed that human capital exerts a positive impact on financial competitiveness, and Costa et al. (2020) found that human capital is the key element that contributes to competitiveness and business success. Khalique et al. (2013) discuss the importance of knowledge base theory, whereas Khalique et al. (2011b) argue that human capital is recognized as the heart of intellectual capital. Furthermore, Edvinsoon and Malone (1997), Bontis (1998), Choo and Bontis (2002), Shaari et al. (2010), and Isaac et al. (2010) argued that human capital is the most important component of intellectual capital and is based on employees' knowledge, competence, skill, capability, and innovation (as cited in Khalique et al., 2013). According to Roos and Roos, 1997; Shaari et al., 2010, the primary source of intellectual capital creation in organizations is human capital (as cited in Khalique et al., 2013).

Furthermore, they mentioned that capital employed efficiency and human capital efficiency have a positive relationship with the return on assets, and the high efficiency of physical, financial, and human capital leads towards high profitability. Structural capital efficiency (SCE) is insignificant for return on asset (ROA), return on equity (ROE), and Asset turnover (ATO) but shows a positive relationship. The results show that for each one unit increase in human capital efficiency, there is an increase in return on assets of 0.0057 times the unit, a return on equity of 0.0007 times the unit, and an asset turnover of 0.0107 times. Further, structural capital shows a positive correlation coefficient of 0.013 with return on assets and 0.014 with return on equity, respectively, and shows that structural capital affects firm performance positively but not significantly. The results show that by increasing one unit of capital employed efficiency, it increases return on assets by 0.0734, return on equity by 0.233, and return on assets by 0.855. A further one-unit increase in structural capital efficiency increases the return on assets by 0.013, the return on equity by 0.014, and decreases asset turnover by 0.011. From the above results, the following regression equation can be derived from the available data for predicting the return on assets, return on equity, and asset turn over.

ROA = -0.0140 + 0.0057 HCE + 0.0130 SCE + 0.0734 CEE

ROE = 0.0675 + 0.0007 HCE + 0.01426 SCE + 0.2330 CEE

ATO = 0.6858 + 0.0107 HCE - 0.01113 SCE + 0.3850 CEE

However, the model explains that an increase in human capital efficiency, structural capital efficiency, and capital employed efficiency increase the return on assets and return on equity. Furthermore, human capital efficiency is positively affected for all dependent variables: return on assets, return on equity, and asset turn over. Except for the dependent variable return on equity, human capital efficiency was found to be a significant predictor of firm financial performance. Capital employed efficiency positively affects and is identified as significant for all dependent variables. Further analysis shows that structural capital efficiency is not significant for all returns on assets, return on equity and asset turn over.

Qualitative Analysis

Present research findings based on secondary data revealed that intellectual capital affects firm financial performance in power and energy sector companies in Sri Lanka, and human capital and capital employed are significantly affected for financial performance, while structural capital efficiency insignificantly affects financial performance in power and energy sector companies in Sri Lanka. The empirical findings revealed that there is a significant positive relationship between human capital efficiency and the return on assets. The literature reviews show that there is reasonably strong evidence to show that the infusion of human capital enhancement' in organizations promotes innovativeness and greater firm performance. In support of the preceding, studies by Guthrie (1977) clearly indicate that the factor of human capital has a positive impact on financial performance. Azlina et al. (2017) measured human capital efficiency and firm performance in the Malaysian technology industry using data extracted from the annual reports of all Malaysian technology companies listed in 2009. Empirical findings revealed a significant positive relationship between human capital efficiency and the return on assets. Further, Edziah et al. (2021) demonstrated that developing human capital enhances energy efficiency. The current findings are consistent with the fact that human capital is positively correlated with firm financial performance in the power and energy sectors in Sri Lanka. Xu and Li (2020) supported the research findings by revealing that capital employed efficiency is the most influential factor for firm profitability and structural capital is not significant for profitability. According to the findings of Mondal and Ghosh (2012), human capital efficiency (HCE) and profitability are almost significantly and positively related, and in comparison, to human and physical capital, structural capital is the least important. Researchers intend to collect data through interviews to conduct a detailed analysis to investigate the real perception of the relationship between human, structural, relational, and capital employed efficiency with firm financial performance, as well as other factors influencing firm financial and overall performance in the power and energy sectors in Sri Lanka.

Analysis of Interview Data

The officers chosen for interviews use a snowball sampling technique**.** This section presents and discusses the findings of a thematic analysis of qualitative data related to the thesis's one research question. An interview guide was created based on the study's research questions and issues identified in the literature. These preliminary questions were modified to fit the study's context. The primary issues addressed in the interview instruments were consistent across all respondents. To rationalize the findings of quantitative analysis and identify real perception, interview questions are directed to obtain data to answer the research questions, namely: What is the impact of human capital efficiency on the financial performance of the power and energy sectors in Sri Lanka? What is the impact of structural capital efficiency on the financial performance of the power and energy sectors in Sri Lanka? What is the impact of relational capital efficiency on the financial performance of the power and energy sectors in Sri Lanka? What is the impact of capital employed efficiency on the financial performance of the power and energy sectors in Sri Lanka? and what other factors influence for finance and overall performance of power and energy sector in Sri Lanka. Further interview questions are aimed at eliciting responses for the main dimensions of each component's human, structural, relational, and capital employed efficiency, with the objective of maximizing their efficiency. There are numerous factors that may have an impact on the financial performance of the power and energy sectors in Sri Lanka, and interview questions are encouraged to express this information. When they deviated from the objective, questions

were asked to get them back on the right path. The interview guide is attached as appendix B. Data from interviews is transcribed and imported into Nvivo software, where the main codes and themes are identified.

According to the response, the general manager of finance, two deputy finance managers, and an executive confirmed that financial performance is measured through net profit and loss and financial ratios such as asset turn over, return on assets, and return on equity, while the general manager of finance, two deputy finance managers, and an accountant mentioned cashflow is more important. Furthermore, as mentioned by the chief finance officer and an executive, budget variance analysis and budgetary control are used to measure financial performance. They try to keep expenses within their budget and thus increase profit. According to the responses of interviewees, all did not know the term "Intellectual Capital," and by explaining that intellectual capital means human capital efficiency, structural capital efficiency, and relational capital efficiency all together, they understood the term. Further, they are not familiar with human capital efficiency, and they explained it as employee efficiency. Further interviewees are not familiar with structural and relational capital, and once explained, they get the idea. The General Manager of Finance, the Chief Financial Officer, two deputy finance managers, and an executive all identified motivation as an important factor in improving human capital efficiency. According to the General Manager of Finance and an executive, a friendly environment in the organization, appreciation of employee ideas, freedom to make decisions, a stress-free environment, and management treating everyone with respect regardless of position, role, or title are significant in increasing human capital efficiency and thus increasing firm financial performance and Ting and Lean (2009) findings are consistent with that (as cited in Tran and Vo, 2020). They highlighted that human capital includes innovation, capacity, creativity, know-how, previous experience, teamwork capacity, employee flexibility, tolerance for ambiguity, motivation, satisfaction, learning capacity, loyalty, formal training and education. Further findings are in line with Xu & Liu (2019), who mentioned that vocational training can improve employees' ability to acquire knowledge and apply knowledge in practice, thus improving companies' technical level. This method can produce a high return on investment in a short period of time. Furthermore, the Chief Financial Officer, Deputy General Manager, and two accountants emphasize the importance of the organization's recruitment policy in increasing human capital efficiency. Even though higher-level positions are filled with qualified candidates, lower-level employees are not hired on the basis of their qualifications. They emphasize the importance of recruiting capable people for lower-level positions and providing training as needed in order to increase human capital efficiency in the organization.

The Chief Financial Officer, two deputy finance managers, the Deputy General Manager Finance, an accountant, and an executive confirm that databases and information systems are more important under structural capital and that by doing so, the company can reduce costs and improve efficiency, ultimately leading to increased financial performance. The present findings are in line with those of Arslan & Zaman (2014), whose studies revealed that human capital efficiency and structural capital efficiency play critical roles in improving firm performance. Further, the general manager of finance, chief financial officer, deputy general manager finance, and two deputy finance managers emphasize the importance of structural capital efficiency and the need for an ERP system for the organization in improving overall efficiency and, as a result, improving financial performance. The General Manager of Finance, two deputy finance managers, an accountant, and an executive mentioned that relational capital, which is a component of intellectual capital, affects the increase in intellectual capital. It helps customers and suppliers stay with the firm and maintain both internal and external relationships, which increases financial performance. Accordingly, resource dependency theory explains that all firms cannot acquire all strategic resources and must develop strong relationships with other organizations that can assist firms' operations in terms of strategic resources. Further the findings are consistent with the study conducted by Smriti & Das (2018), which revealed that among the VAIC components, customer capital and structural capital were the most important contributors to firm performance. Further, according to Xu & Liu (2020), relational capital has a negative impact solely on a firm's profitability, which contradicts current findings. With respect to capital employed, all interviewees mentioned that it is more important for the financial performance, and it’s more important to reduce the energy loss and increase the financial as well as overall organization performance. This finding is in line with the results from previous studies by Chowdhury et al. (2018), who revealed that capital employed efficiency plays a critical role in ensuring higher productivity and reaffirming the primitive stage of intellectual capital utilization in the textile sectors of emerging economies; and Xu & Liu (2020), who revealed that capital employed efficiency has the greatest impact on the performance of Korean manufacturing firms. Furthermore, the current study supports the idea of Smriti & Das (2018), who discovered that capital employed efficiency positively influenced the current year's firm performance. The present research findings using qualitative methods are in line with the findings of Olarewaju & Msomi (2021), who found that significantly, the three components of intellectual capital have an impact on the financial performance of the insurance sector. Furthermore, most of the interviewees, General Manager Finance, Chief Financial Officer, one Deputy Finance Manager, two accountants, and an executive mentioned that human capital efficiency, structural capital efficiency, relational capital efficiency, and capital employed efficiency are all linked with each other and, all together, involve an increase in financial performance, which supports the study of Inkinen, (2015), who found that the intellectual capital dimensions may not produce firm performance-enhancing effects on their own, but their combined strength increases the potential. Furthermore, according to (Nadeem, 2016), organizational learning theory, it is important to invest in human, structural, and relational capital in order to benefit from intellectual capital. The investment is objective, which can increase employee motivation and their ability to generate new ideas. More structural capital investments will enable the incorporation of innovation into existing products as well as the introduction of new products. In exploring the factors affecting the financial performance of power and energy companies in Sri Lanka, according to respondents' chief

financial officer, deputy general manager finance, two deputy finance managers, two accountants, and an executive, political influence has a significant impact on business financial performance as well as overall performance.

Further, General Manager Finance, two deputy finance managers, and an accountant mentioned that weather conditions greatly affect financial performance. According to them, during rainy seasons, they can reduce production costs and thus improve financial performance. In addition, fuel is a high component of the total cost, and in rainy conditions, they can switch from fuel to hydro generation. Furthermore, in the rainy season, mini hydro generation companies can increase their revenue by increasing sales units. Furthermore, a Deputy General Manager Finance, two Deputy Finance Managers, and an accountant mentioned that government decisions have a direct impact on financial performance. They do not make decisions that allow for cost-reflective tariffs that have a direct impact on financial performance. No decision is made to raise tariffs, and thus no revenue is generated to cover even the costs. It is necessary to have a cost-reflective tariff that allows for cost coverage based on the current economic situation. It is critical to distinguish between service sustainability and service provider sustainability. An appropriate tariff design should ensure effective recovery of all costs incurred by the entity in providing efficient electricity supply to all classes of consumers while also encouraging efficiency in electricity consumption.

Conclusion

Summary of the research findings

The descriptive results show that intellectual capital tends to be higher for firms that have high performance. However, the detailed investigation revealed that the energy sector in Sri Lanka has different levels of intellectual capital efficiency and performance. The current study discovered a positive relationship between capital employed efficiency and return on assets, return on equity, and asset turnover, the most important factor influencing firm financial performance. The research findings support the study by Xu and Liu (2020), who found that capital employed efficiency is the most influential contributor to firm profitability in the manufacturing industry. This means that the higher the capital employed efficiency of a power and energy sector firm is, the more financial performance the firm can have. The findings of this study reveal a positive relationship between human capital efficiency and return on assets, return on equity, and asset turnover, which is in line with the findings of Xu and Liu (2020), who discovered that human capital efficiency positively influences firm profitability as measured by return on assets and return on equity; Olarewaju and Msomi (2021), who discovered that all components of intellectual capital have a substantial impact on the financial performance of the insurance industry; and Azlina et al. (2017), who discovered that there is a significant positive relationship between human capital efficiency (HCE) and return on assets (ROA) in Malay technology companies. Further, the findings are in line with Weqar & Imamul Haque, (2020), who found that capital employed efficiency is the most significant element in accelerating the financial performance of the Indian textile industry. Further, findings by Costa et al. (2020) revealed that human capital is the key element that contributes to the competitiveness and business success of entities in the hospitality and tourism sectors and provides evidence for the present findings, which do not agree with Liu et al. (2021), who found that physical capital has no impact on financial competitiveness. Furthermore, most previous studies using the widely used VAIC method revealed that human capital efficiency affects business financial performance, which is consistent with findings in Sri Lanka's power and energy sector. The findings suggest that spending on employees should be treated as an investment, and firms should effectively use these human resources to create more wealth. The findings of Weqar, Sofi, and Haque (2020) are in line with present research findings which found that amongst the VAIC constituents, the efficiency of physical capital and human capital were the most significant contributors to the firms' financial performance. The empirical findings of this study reveal that structural capital is positively related to return on assets and return on equity, which is insignificant. Bayraktaroglu et al. (2019), discovered a positive relationship between structural capital and return on assets and return on equity in the Turkish manufacturing sector (as cited in Liu et al., 2021). Furthermore, the findings are in line with those of Xu and Liu (2020), who found that structural capital efficiency has no substantial impact on business performance in South Korea's manufacturing sector. Therefore, the results show that, as a whole, intellectual capital affects the firm financial performance of power and energy sector companies in Sri Lanka, and human capital and capital employed are positively and significantly affected financial performance, while structural capital efficiency affects financial performance insignificantly in power and energy sector companies in Sri Lanka.

In addition, the researcher conducted an interview survey and used thematic analysis to rationalize and investigate real perception of the quantitative survey findings and answer the research question, "What other factors influence the financial and overall performance of the power and energy sectors in Sri Lanka?" In support of this, Rahimpour et al. (2020) stated that future research should consider more than one method of collecting information, such as interviews and using the opinions of industry experts in analyzing the results. The response to interviews, revealed that not only asset turnover, return on assets, and return on equity are used to measure financial performance, but also gross profit, net profit, cashflows, and budgetary controls are used to measure financial performance. Furthermore, they emphasize the importance of strictly adhering to the budget, controlling costs, and thus increasing profits.

Furthermore, while the term intellectual capital is well-known in previous research conducted internationally, it is unfamiliar to even those in senior positions in the power and energy sector in Sri Lanka, and they are also unfamiliar with the terms human capital efficiency, structural capital efficiency, relational capital efficiency, and capital employed efficiency. Further, for human capital efficiency, they know it as employee efficiency. The wording "capital employed efficiency" is not familiar to all interviewees, and they identified it as the asset base of the organization. Motivation, training, a friendly environment

in the organization, appreciation of employee ideas, freedom to make decisions, a stress-free environment, and management treating everyone with respect regardless of their position, role, or title are identified as important dimensions to improving human capital efficiency. To support that, Ting and Lean (2009) mentioned that human capital includes teamwork, creativity, employee flexibility, ability to tolerate ambiguity, motivation, satisfaction, academic competency, loyalty, training, and formal education (as cited by Tran & Vo, 2020). Further findings are in line with Xu & Liu (2019), who highlighted that vocational training can improve employees' ability to acquire knowledge and apply knowledge in practice and improve the return on investment. Furthermore, it revealed that databases and information systems are more important in terms of structural capital, as they allow the company to cut costs, improve efficiency, and finally improve financial performance as well as the overall performance of the entity. Further interview processes revealed that relational capital is more important for customers and suppliers to stay with the organization, which leads to better performance of the organization. Furthermore, it revealed that capital employed efficiency is more important in reducing energy losses and improving firm finance as well as overall performance. By analyzing the data gathered from interviews, it confirms that human capital efficiency, structural capital efficiency, relational capital efficiency, and capital employed efficiency are most important to increase the financial and overall performance of the organization. Furthermore, it was discovered that the human, structural, relational, and capital resources used are all interconnected and, when combined, have greater power in increasing finance and overall performance. Further, it was discovered that political influence, weather conditions, and government decisions all have a direct impact on firm financial performance. Furthermore, pricing formulas that have not been developed to allow for cost-reflective tariffs have a direct impact on financial performance.

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