Human Capital Efficiency and Employee Productivity: A Comparative Analysis of the Manufacturing Sector vs. Service Sector Public Listed Companies in Sri Lanka

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Abstract

Human capital is one of the most vital organizational knowledge assets, which is a part of organizational Intellectual Capital. Therefore, it contributes to organizational competitive advantage through enhancing employee productivity. Hence, the objective of this study was to find out the relationship between Human Capital Efficiency (HCE) and Employee Productivity (EP) in manufacturing sector companies and service sector companies listed in Colombo Stock Exchange as a comparative study. Value Added Intellectual Coefficient (VAIC) is a method used to measure the value creation efficiency of a company and HCE is one component of VAIC, which has a substantial impact on EP. Therefore, it is vital for finding out the relationship between HCE and EP in the practical scenario. But, there is a dearth of studies related to the relationship between HCE and EP in Sri Lanka. This study is carried out as a solution for bridging this empirical and contextual gap. Data were collected from 25 manufacturing companies and 25 service sector companies (Hotel and travel sector) during the period from 2015 to 2019. The data were analyzed using the Pearson Correlation and regression. The results of the data analysis indicated that the relationship between HCE and EP is moderate and significant in service sector companies, while an insignificant weak relationship was found in manufacturing sector companies. Further, a significant impact of HCE on EP was found in the service sector, but that impact was not significant in the manufacturing sector. It can be concluded that service sector companies pay more attention to enhance the HCE since the knowledge and skill embedded in employees are more valuable in providing services to their customers than manufacturing sector companies. Ultimately, the results show that good HCE can indeed improve EP, which has significant meanings for investors, company management, decision-makers, and industry regulators.

Keywords: Employee Productivity, Human Capital Efficiency, Manufacturing sector, Service sector

INTRODUCTION

Three eras have been observed in the history of the economy as the agrarian era, the industrial era, and the knowledge era. Different factors of production play a major role in creating wealth in each

era. The land was the major wealth creating source in the agrarian era, while machinery and natural resources were the principal sources of wealth in the industrial era. Now the economy has entered into the knowledge era and human capital is the main source of wealth creation in the knowledge era (Sharma & Mani, 2012).

In today's knowledge and information-based business world, most of the companies tend to view their human capital as an important asset rather than considering them as cost. The perception and preservation of knowledge workers as an 'asset' rather than a 'cost' could be seen as the required element for employee productivity (Farooq, 2018). The significance of human capital in an organization as an asset is recognized not only in the current era but also from the prior centuries as well. According to Nazari & Herremans (2007), Gary Becker identified the significance of human capital as early as the 1960s. He contended that "*expenditures on education, training and medical care produce human, not physical or financial capital because you cannot separate a person from his or her knowledge, skills, health or values the way it is possible to move financial and physical assets while the owner stays put*".

In the modern knowledge economy, organizational productivity and competitive advantage are no longer based on physical and financial assets but on intangible assets (Oppong & Pattanayak, 2019). The human capital is one of the key elements in organizational intellectual capital, which is seen as an important strategic asset, which leads to sustainable competitive advantages (Hitt et al., 2001; Najibullah, 2005; Iswati & Anshori, 2007; Public,1998). Therefore, human capital as a component in intellectual capital also has the ability to contribute to organizational productivity and competitive advantages.

Though it is more imperative to identify the kahuman capital as a vital asset in an organization, which leads to organizational productivity, competitive advantage, and finally value creation, organizations are averse in doing such due to the measurement complications in human capital.
According to Yusuf, (2013), there are some techniques proposed by scholars in valuing human capital such as Human Resource Costing and Accounting by Johansson and Nilson (1996), Skandia Navigator developed by Edvinsson and Malone (1997), human resource valuation based on value-addition by Monti-Belkaoui, et al. (1995), Economic Value Added (EVA) by Stern & Sterwart (1997), The Value Explorer developed by Andriessen & Tiessen (2000) as well as Value Added Intellectual Coefficient (VAIC^{TM}) of Public (1997). The VAIC model of Public (1997), attempts to identify the value creation efficiency through Human Capital Efficiency (HCE), Structural Capital

Efficiency (SCE), and Capital Employed Efficiency (CEE). Ghosh and Mondal, (2009) highlighted the importance of the VAIC™ since it places an emphasis on the value of employees, a key component of intellectual capital.

Therefore, HCE is a rational indicator of symbolizing the value of employees in an organization, which leads to organizational productivity and competitive advantage. According to Knowledge-based View (KBV) and Intellectual Capital based View (ICBV), human capital is one of the hidden knowledge-based sources of organizational competitive advantage and value creation (Ujwary-Gil, 2017). The efficient and effective utilization of human capital in an organization is vital to enhance its overall effectiveness and efficiency, which finally improves the organizational overall productivity (Hanaysha, 2015). Disclosure of information on human capital may perhaps be used by investors in evaluating the company's efficiency and forecasting future profitability and productivity of the company (Yusuf, 2013). Thus, human capital can be recognized as a source of organizational productivity, which affects value creation by enhancing competitive advantages.

Employee productivity, on the other hand, is an important indicator that leads to a better overall performance of the organization. Enhancing employee productivity has been a crucial issue in past research studies both in manufacturing as well as in-service sectors. This is due to the improved employee productivity can increase the overall performance of an organization and its competitive advantage (Hanaysha, 2015).

There is a lot of evidence that could be observed in the literature in relation to the relationship between a variety of factors and employee productivity. Such factors are work engagement, motivation, job satisfaction, stress, training and development, employee participation, employee empowerment, and so on. Moreover, HCE, on the other hand, was correlated with different kinds of factors like a firm's financial performance and corporate performance, in the literature. Even though the efficient and effective use of human capital is also identified as a factor affecting to improve the organizational overall efficiency and effectiveness resulting to enhance the organizational productivity including employee productivity, no evidence was found in the literature on the relationship between efficient usage of human capital or HCE and employee productivity.

Therefore, this study attempted to explore the relationship between HCE and EP and the impact of HCE on EP in Sri Lankan Public Listed Companies (PLCs). Further, the study was carried out as a

comparative study between manufacturing sector PLCs and service sector PLCs in Sri Lanka, since the literature evidenced that, the prominent importance of employee productivity studies in both manufacturing and service sector companies (Hanaysha, 2015).

The rest of the article is organized as follows; the next section depicts the review of relevant literature and then the methodology, findings, and discussion will be discussed respectively. Final section deals with the conclusion of the study with directions for future research.

LITERATURE REVIEW

Human Capital Efficiency

The human capital can be defined as "*the competence, skills, experience and intellectual abilities of the individual employees*" (Chang, n.d.). Human capital can be identified as the biggest and the principal intangible asset in an organization. Eventually, it offers the goods or services required by the customers or provides solutions to their problems. Human capital contains the collective knowledge, competency, experience, skills, and talents of people within an organization. It also consists of the creative capacity of an organization and its ability to be innovative (Ghosh & Mondal, 2009).

According to Bontis & Cabrita (2008), human capital can be defined as the "*general employee sentiments in an organization, which is described as a function of employee satisfaction, commitment and motivation positively impact the sharing and generation of knowledge, retention of key people and ultimately, business performance.* Tovistiga & Tulugurova (2007) explained that *"human capital embodies competence (people embodied knowledge, capabilities and skills and experiential knowledge), attitude (behavior, motivation and ethical conduct) and intellectual ability (innovation, imitation, and adaptation)".* Human capital contains employees' capabilities, skills, knowledge, technical expertise, etc. that are currently used within the firm or can possibly be used in order to create value for the firm (Cohen & Kaimenakis, 2007).

Although investment in human capital is vital and growing, there is no standard measure to quantify its efficiency and effectiveness in companies' balance sheets (Ghosh & Mondal, 2009). But it is necessary to assess the value of human capital to identify its efficient and effective usage since the human capital contributes more to enhance the productivity, competitive advantages, and value creation of an organization.

Efficiency is commonly defined as the relationship between the outputs achieved and the inputs used. The efficiency of human capital can be expressed as a percentage of the value of the company's output and the value of the input, i.e. the human capital (Kucharcikova et al., 2016).

HCE is the ratio between human capital and value-added by the company. This ratio indicates the value added by every unit of money spent on human resources by the company (Sharma & Mani, 2012).

HCE is one indicator of Value Added Intellectual Coefficient (VAIC) developed by the Public (1998) and it was used by most of the scholars (Chen *et al.,* 2005; Chen, 2009; Makki, *et al.,*2008; Najibullah, 2005; Ghosh & Mondal, 2009) in intellectual capital literature to quantify the human capital. Therefore, HCE calculated under the VAIC model is seen as the most prominent method of valuing human capital efficiency in an organization.

Employee Productivity

Employee productivity can be seen as the trending topic in the literature since it is one of the challenges faced by organizations when managing its human capital. Employee productivity acquires importance among other things within an organization, as organizational success depends more on employee productivity. It is a vast area in which an organization should pay deeper attention since the main purpose of doing the work is to gain the maximum output with minimum costs (Hanaysha, 2015).

Productivity can be identified as an indicator of performance, which consists of both efficiency and effectiveness. Therefore, it is significant to recognize who are productive workers within an organization (Bhatti & Qureshi, 2007). One of the main goals of any organization is to increase income, or profit per employee. Increasing human capital and its efficiency bring higher financial results per employee (Kucharcikova et al., 2016). Hanaysha, (2015) elaborated that, employee productivity can be assessed based on the output of an employee over a particular period of time. Hanaysha, (2015) further mentioned that productivity shows the usage of a variety of resources or inputs in an organization to reach the expected level of outcomes. As an overall view, employee productivity denotes the output that an employee attains over a specific time period.

Employee productivity is considered by most of the organizations as one of their major objectives to fulfill. This is due to the fact of providing different advantages to the organization and to its employees from the higher levels of employee productivity. For example, organizations can acquire satisfactory economic growth, social progress, and can earn huge profits. On the other hand, improved employee productivity leads to better wages and salaries, good working conditions, and favorable employment opportunities for organizational employees (Hanaysha, 2016; Sharma & Sharma, 2014).

Improved employee productivity leads to different results, like; gaining competitive advantages, reaching favorable financial performance, achieving organizational goals and objectives, and fulfilling stakeholders' expectations in terms of value creation Kien (2012).

METHODOLOGY

Conceptual Framework and Hypotheses

Most of the previous studies have found that HCE is the major component of VAIC, which influences the organizational performance positively and hence, to the improvement of employee productivity (Goh, 2005; Ghosh & Mondal, 2012; Kamath, 2015). Goh (2005) evidenced that HCE is the most important IC component and a very important indicator of value creation, especially in banks. Ghosh & Mondal (2012) have done a study based on the banking sector in India and ensured a significant positive relationship between HCE and bank productivity. Furthermore, Kamath (2015) studied on IC and performance and recognized that HCE was the major component of IC with an impact on productivity. Moreover, Maji and Goswami (2016) and Tripathy, *et al.*, (2015) indicated that HCE affects firm performance positively. Most of the prior studied to confirm the positive relationship between HCE and EP in Service sector companies.

Accordingly, the following conceptual framework was developed for the current study followed by the hypotheses.

Figure 1: Conceptual Framework

Source: Developed by authors

Based on the literature and conceptual framework developed, the hypotheses of this study are;

H1: There is a positive relationship between HCE and EP in the service sector and manufacturing sector PLCs in Sri Lanka.

H2: There is a positive impact of HCE on EP in the service sector and manufacturing sector PLCs in Sri Lanka.

H3: The relationship between HCE and EP is favorable in the service sector than in the manufacturing sector in Sri Lanka.

H4: The impact of HCE on EP is favorable in the service sector than in the manufacturing sector in Sri Lanka.

Operationalization of Variables

The following table presents the operationalization of the variable used in this study.

Table 1: Operationalization of Variables

Variable Type	Variable Name	Measurement Method	Source
Independent	Human Capital Efficiency (HCE)	Value Added/Human Capital	Public, 1998; Chen *et al*., 2005;
Dependent	Employee productivity (EP)	Earnings before Interest & Tax/Number of employees	Oppong & Pattanayak, 2019; Chen *et al*., 2005;

Note: Value Added Intellectual coefficient (VAIC) developed by Pulic (1998) was used to measure HCE. Value Added = Output-Input (Output = Gross income & Input = operating expense) and HC = employee cost

Source: Compiled by authors

Population, Sample, Data Collection and Analysis Techniques

Manufacturing sector PLCs and Service sector, which is represented by hotel and travel sector PLCs are the population of the study. There are 37 manufacturing sector PLCs and 37 Hotel and Travel sector (Service sector) PLCs listed in the Colombo Stock Exchange (CSE) as at 31st December 2019. Out of total PLCs, 25 manufacturing sector PLCs and 25 service sector PLCs were selected as the sample based on the random sampling.

Data were collected from the annual reports of selected PLCs covering the period from 2015 to 2019. All the data were taken from the audited financial statements of PLCs. Gathered data were analyzed using Pearson correlation and regression analysis. Further, descriptive statistics were used for explaining the behavior of the data.

FINDINGS AND DISCUSSION

Descriptive Statistics

The descriptive statistics including mean, standard deviation, the maximum limit, and the minimum limit of all the variables concerning the current study were presented by Table 2 and Table 3 for the manufacturing sector and service sector respectively.

Table 2: Descriptive Statistics – Manufacturing Sector

Variable	Minimum	Maximum	Mean	Std. Deviation
Employee Productivity	-357.45	1728.39	407.8541	400.74129
Human Capital Efficiency	-45.82	1128.22	13.2990	97.40011

Source: Compiled by authors

Table 3: Descriptive Statistics – Service Sector

Variable	Minimum	Maximum	Mean	Std. Deviation
Employee Productivity	-722.86	10496.30	278.4274	1075.48618
Human Capital Efficiency	-42.95	83.42	6.5940	13.54415

Source: Compiled by authors

It was observed that, from the two tables above, the average value of EP is greater in the manufacturing sector than the service sector. Further, higher HCE can be observed in the manufacturing sector than in the service sector.

Correlation Analysis

Correlation analysis is the statistical technique employed to analyze the relationship between the dependent and independent variables. Findings from Pearson's correlation are pointed up in Table 4 for the manufacturing sector and service sector.

Table 4: Correlation Matrix of the variables

Variable	Manufacturing Sector	Service Sector
	HCE	
EP	.074	.537**
Sig. (2 tailed)	.396	.000
**. Correlation is significant at the 0.01 level (2-tailed).		

Source: Compiled by authors

The relationship between HCE and EP in the manufacturing sector PLCs is positive, but not significant (p >0.05) and it was a very weak relationship. A positive significant relationship can be observed between HCE and EP in service sector PLCs, while it was a moderate relationship.
Accordingly, the first hypothesis of the study (H1: There is a positive relationship between HCE and EP in the service sector and manufacturing sector PLCs in Sri Lanka) can be accepted for service sector companies, but it has to be rejected for manufacturing companies.

The third hypothesis of the study (H3: The relationship between HCE and EP is favorable in the service sector than in the manufacturing sector in Sri Lanka) can also be accepted, since the correlation between HCE and EP in the service sector was a moderate one and it was a significant positive significant correlation, comparatively to the correlation found for manufacturing sector PLCs (Weak positive insignificant correlation).

Regression Analysis

Once identified the relationship among the particular variables, then it is necessary to explore the linear association among the variables and to estimate the explanatory power of the independent variables on the dependent variable. Therefore, the regression analysis was used for the above purposes after examining the correlations among the variables. Following Table 5 and Table 6 illustrate the regression results for the manufacturing sector and service sector PLCs respectively.

Table 5: Results of Regression analysis – Manufacturing sector

Model		B	Standard Error	β	t	Sig.	R^2
1	(Constant)	1038.444	286.793		3.621	.000	.018
	Human Capital Efficiency	2.238	2.864	.068	.781	.436	
a. Predictors: (Constant), Human Capital Efficiency							
b. Dependent Variable: Employee Productivity							

Source: Compiled by authors

The results of the regression analysis relating to manufacturing sector PLCs shows that there is a positive, but the insignificant impact of HCE on EP. The further explanatory power of HCE on EP is

only 1.8%, implying the majority of the variation of EP (98.2%) might be explained by the other factors which are not considered in this study.

Table 6: Results of Regression analysis – Service sector

Model		B	Standard Error	β	t	Sig.	R^2
1	(Constant)	-34.349	149.122		-.230	.818	.291
	Human Capital Efficiency	42.096	6.285	.530	6.698	.000	
a. Predictors: (Constant), Human Capital Efficiency							
b. Dependent Variable: Employee Productivity							

Source: Compiled by authors

There is a significant positive impact of HCE on EP that can be observed in the service sector PLCs. Moreover, the 29.1% variation of EP can be explained by the HCE and 70.9% of the variation of EP is explained by other factors, which are not taken for the current study.

When comparing the regression results of the manufacturing sector and service sector, it is observed that the service sector PLCs have a positive significant impact of HCE on EP, while there is no significant impact of HCE on EP in manufacturing PLCs. Furthermore, the explanatory power of HCE on EP is higher in the service sector than in the manufacturing sector.

In accordance with the regression results of the study, the second hypothesis (H2: There is a positive impact of HCE on EP in the service sector and manufacturing sector PLCs in Sri Lanka) can be accepted for service sector PLCs, but not for PLCs in the manufacturing sector in Sri Lanka. In addition to that, the fourth hypothesis of the study (H4: The impact of HCE on EP is favorable in the service sector than in the manufacturing sector in Sri Lanka) is accepted, since the regression coefficient of HCE is 2.238 in the manufacturing sector, while it is 42.096 in the service sector. Further, the coefficient in the manufacturing sector is not a significant one, but it is significant in the service sector.

The following table summarizes the hypotheses testing of the study.

Table 7: Summary of Hypotheses Testing

Hypothesis No.	Hypothesis	Sector	Decision	Tool
H1	There is a positive relationship between HCE and EP in the service sector and manufacturing sector PLCs in Sri Lanka.	Manufacturing	Rejected	Correlation
		Service	Accepted	Correlation
H2	There is a positive impact of HCE on EP in the service sector and manufacturing sector PLCs in Sri Lanka.	Manufacturing	Rejected	Regression
		Service	Accepted	Regression
H3	The relationship between HCE and EP is favorable in the service sector than in the manufacturing sector in Sri Lanka.	Accepted		Correlation
H4	The impact of HCE on EP is favorable in the service sector than in the manufacturing sector in Sri Lanka.	Accepted		Regression

Source: Compiled by authors

According to the hypotheses testing, both H1and H2 are accepted in relation to the service sector, while both are rejected in the manufacturing sector. Both H3 and H4 of this study are accepted based on the correlation and regression analysis results.

CONCLUSION

Human capital plays a prominent role among other organizational strategic assets, which leads to creating a competitive advantage, enhance organizational productivity, and ultimately to create value for all the stakeholders of the organization. Therefore, human capital is paid deep attention in an organizational setting in this knowledge-based business society. Hence, identifying the efficiency of human capital is vital and several attempts have been taken by the previous scholars in measuring and quantifying the efficiency of human capital. Among such measurement, VAIC, developed by Public (1998), which has been developed to measure the overall efficiency of intellectual capital including human capital, comes into the most noticeable place and HCE is identified as one of the most dominant components in VAIC. Prior studies evidenced that, the HCE has a positive impact on organizational performance including employee productivity. Though such evidence exists, the empirical studies on the relationship between HCE and EP as well as the impact of HCE on EP are at the infancy level. This study was carried out to fill the gap of lacking such empirical studies.

For the purpose, Sri Lankan PLCs in both the manufacturing sector and the service sector were selected and data were collected during the tenure of 2015-2019 from the annual reports of selected PLCs. The person correlation analysis and regression analysis were employed to analyze the data.

It was found that the relationship between HCE and EP in the manufacturing sector was a weak positive insignificant one, while there was a significant positive moderate relationship between HCE and EP in service sector PLCs in Sri Lanka. Further, it was found that the impact of HCE on EP in the service sector was a significant positive one, while in the manufacturing sector, it was a positive but insignificant impact of HEE on EP.

Therefore, it can be concluded that human capital in the service sector is more efficiently contributing to enhancing the productivity of human capital in the service sector than in the manufacturing sector. The reason behind these findings depends on the knowledge intensity in service sector employees than in manufacturing sector employees. Since the service sector employees are dealing with customers and clients directly and maintaining a relationship with them, which are more human-nature relationships, their level of efficiency should be in a higher position than the employees in the manufacturing sector, who are less directly dealing with human relationships.

Future studies can be extended to other knowledge-intensive sectors in CSE as well as in the international context. Further, the research model can be improved by adding some control variables, which affect EP, such as; capital employed efficiency, structural capital efficiency, and overall efficiency of intellectual capital. The research model can further be developed by incorporating qualitative measurement for HCE and EP as well as by adding more qualitative type control variables, such as; employee engagement, employee empowerment, training and development, and employee participation.

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