

THE ROUTE TO CORPORATE SOCIAL VALUE VIA HEALTH AND SAFETY PERFORMANCE, PRODUCTIVITY, AND MANAGEMENT QUALITY

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Abstract

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The article discusses the relationship between global pandemic and macroeconomic development by demonstrating the critical role of occupational health and safety (OHS) risk management in-between. OHS is a key component of the environmental, social, and governance (ESG) practice, which has contributed to the intangible asset value and investment return of listed companies. Through literature review and case studies, the research found that there is a lack of solid evidence in verifying the relationship between OHS activities and business performance. Public health risk, such as COVID-19, unveils its direct and indirect impact on macroeconomic and microeconomic development. O'Donnell (2000) and Gahan, Sievwright, and Evans (2014) believe the quality of OHS management has a critical impact on workers' productivity, a root-value driver of organizational value. Moreover, good OHS risk management and governance practices represent non-financial factors and enhance the intangible value of organizations through productivity and quality improvement. As the result of the study, it develops a conceptual framework for linking top-line organizational values with corresponding bottom OHS activities and helps organizations understand the logic behind the bottom-up value transmission mechanism. The quantitative analysis of the conceptual framework goes beyond the scope, and suggestions for further research are put forward.

Keywords: Health and Safety Risk Management, Corporate Governance, ESG Factors, Quality of Management, Workers' Productivity, Corporate Social Responsibility

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1. INTRODUCTION

The impact of health and safety incidents on human life and properties are interrelated between public places and workplaces. This is because workplace issues are likely to crawl into private living, and vice versa. The novel coronavirus-induced pneumonia syndrome, namely COVID-19 pneumonia, is a good example to testify to the two-way relationship

between the public place and the workplace. The pneumonia epidemic was initially noticed in the city of Wuhan, China at the dawn of 2020 and has already turned into a global pandemic.

The COVID-19 global pandemic has persisted for over two and a half years since its outbreak towards the end of December 2019. The novel disease has demonstrated its prowess to cast a negative impact on macroeconomic development and business performance. Public and occupational

health and safety (OHS) risk management have played a critical role in managing organizations' risks, which allows organizations to demonstrate their ability to enhance investors' return through raising the quality of management and deploying the OHS risk management good practices.

Numerous studies on good practices have discussed the positive relationships between OHS, productivity and company performance, such as Gahan, Sievwright, and Evans (2014), Parkinson (2013), and Fernández-Muñiz, Montes-Peón, and Vázquez-Ordás (2009). However, a new research focus is expected to identify core root-value drivers of productivity and organizational value and measure the sensitivity of productivity and organizational value to each driver, *ceteris paribus*. This requires a significant amount of evidence from empirical research and daily activities focusing on the link between occupational health and safety management system (OHSMS) and business performance.

Moreover, numerous studies have testified to the relationship between OHS and positive business outcomes (tangible and intangible). However, the measurement of business values attributed to OHSMS lacks solid evidence, which is another gap found in the literature review.

Besides wrong perceptions and resource constraints, one of the primary reasons for the sluggish deployment of OHSMS is the lack of accurate measurement of net benefits, regarding financial performance and workers' productivity. Hence, the study aims to develop a conceptual framework, which connects top-line organizational values with corresponding OHS activities on the floor and helps organizations understand the logic behind the bottom-up value transmission mechanism.

The development of a conceptual framework is based on an integrated OHSMS model, in which risk management, financial, and microeconomics theories are applied in constructing the value transmission mechanism, labour productivity factor, and cost-and-benefit analysis.

With the evidence of the COVID-19 global systematic risk, the study presents a new perspective in the space of OHS risk management, which focuses on intangible factors that impact organizational value and investment return. From the statistics point of view, these factors are part of the error term of regression analysis; they are often neglected in investment analysis due to the difficulty in quantitative analysis. The error term is critical to explaining unexpected investment performance associated with the OHS management initiatives, which is a critical issue in the space of ESG, corporate social responsibility, and sustainability.

The research deploys a combined methodology of literature review, quantitative analysis, case studies, and cause-and-effect analysis, based on which a series of factors that connect organizational value with the OHS activities are identified. As the aim of the study is to develop a conceptual framework that connects OHSMS, productivity, quality, and organizational value, the literature review primarily focuses on this aspect in Section 2 of the study.

With the impact of the COVID-19 incidents on macroeconomic and microeconomic development, the study identifies the need of developing a conceptual framework, regarding the relationship between the OHS activities and organizational value (as illustrated in Figure 8), which leads to the research results namely, a three-part conceptual framework (as illustrated in Figures 10, 11, and 13).

The remaining part of the paper is structured as follows. Section 2 provides an overview of the literature on OHS management conceptual frameworks. Section 3 gives a brief overview of the research methodology. Section 4 introduces the critical impact of the COVID-19 global pandemic on macroeconomic development, and Section 5 explains how the good practices of health and safety risk and corporate governance enhance organizational value in the context of the COVID-19 global pandemic. As the result of the study, Section 6 develops and discusses a conceptual framework that connects OHS with organizational value and uses the COVID-19 incidents as evidence, in which workers' productivity and the quality of management, among other value drivers, are crucial to the bottom-up value transmission mechanism. In Section 7, the paper concludes by stating the pivotal role of the OHS risk management in raising workers' productivity and enhancing organizational value through the heightened quality of management.

2. LITERATURE REVIEW

The study focuses on the literature in the OHS management conceptual frameworks, regarding the relationship between business performance and OHS activities; they form the basis of literary discussion and research illustration.

Numerous good practices discuss the positive relationships between OHS, productivity, and company performance. Table 1 is an example of performance measurement models and the selection criteria of associated performance measures.

Burton (2010) unveils the interrelationship between personal health and occupational health and the connection between health, productivity, business competitiveness, economic development, and social well-being and wealth. The study developed a framework that comprises a set of key principles and an intervention model to prioritize and implement the initiatives of a healthy workplace. With the outbreak of COVID-19, Dennerlein et al. (2020) propose a theoretical framework based on the integrative approach to safety, health, and well-being namely, total worker health, which identifies the complex factors of individual behaviour and work environment and reveals their impact on health, productivity, and turnover. The study also recommends six implementation characteristics for employers to improve their management systems and employees' well-being during the unprecedented time of COVID-19.

Regarding the impact of workplace health and safety on business performance, Kabir, Watson, and Somaratna (2018) conducted empirical research on the impact of negative safety announcements on stock prices and business value, which suggests

investment in safety measures to mitigate the exposure to unsafe working conditions. Sousa et al. (2021) show evidence of the positive investment return on occupational safety between 1945 and 2008.

Some research focuses on the statistical relationship between occupational safety, productivity, and business performance. For example, Halíčková, Basovníková, and Abramuszkinová Pavlíková (2016) show the insignificant, positive relationship between safety certification (OHSAS 18001) and productivity and business performance, respectively, in the Czech construction industry. In comparison, another study by Shirali, Savari, Ahmadiangali, and Salehi (2017) indicates safety investment had a generally positive relationship with productivity and quality in five steel companies in Iran, although some safety investment measures, such as labour productivity, had an independent or inverse relationship with some productivity and quality variables, such as percentage safety labour costs to labour costs.

However, a new research focus is expected to identify the core root-value drivers of productivity and organizational value and measure the sensitivity of productivity and organizational value to each driver, such as OHSMS, and *ceteris paribus*. This requires a significant amount of evidence from empirical research and daily activities focusing on the link between OHSMS and business performance, as illustrated in Figure 2.

Leading companies perceive every decision as a risk decision and leaders only take calculated risks (“How to live with risks,” 2015). Even though there is an increasing awareness of the positive relationship between OHS, productivity, and organizational value, a common hurdle to deploying OHSMS is perceptions held by large companies that the OHS interventions in the workplace are costly compliance activities and interrupt workers as opposed to investment for productivity and profit. Small companies often do not have the resources and capacity to implement and operate the OHSMS

programs. One of the primary reasons for the sluggish deployment of OHSMS is the lack of accurate measurement of net benefits to the financial bottom line and workers. For example, reduced OHS incident costs and increased workers’ productivity. Hence, the study aims to develop a conceptual framework for linking top-line organizational values with corresponding bottom OHS activities and understanding the logic behind the bottom-up transmission mechanism.

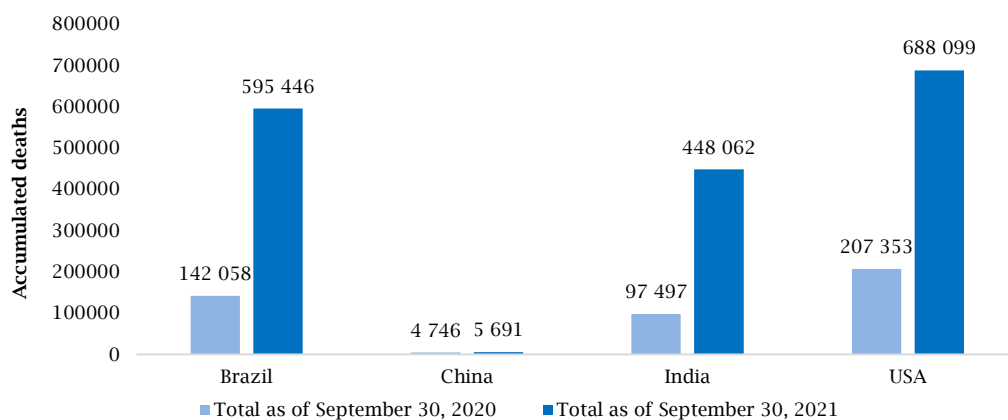
Hesapro’s (2013) 11 case studies revealed that 70% of assessments have confirmed the relationships between OHS and cost (the OHS incident costs, opportunity costs of lost productivity, and OPEX, among others), productivity (output, labour supply, skills, and morale, among others), quality of goods and services, and brand image. However, 54.5% of assessments have not quantified the relationships, respectively. This could be due to the lack of quality data, sound modelling methodologies, and/or data collection methods.

3. RESEARCH METHODOLOGY

The study reviews the literature on OHS risk management systems, corporate social responsibility, and business sustainability. Case studies are developed by observing the impact of the COVID-19 global pandemic on the implementation of health and economic policies in countries, such as China, Canada, and the United States. Moreover, the cross-referencing of the COVID-19 cases and economic growth rates reveals the negative relationship between health incidents and business performance.

As the evidence of the study, the number of COVID-19 death cases (see Figure 1) is the trigger of the continual improvement in OHS risk management and the associated impact on business performance, such as productivity, quality of management, and organizational value. This leads to the development of a conceptual framework that connects the dots between organizational value and the OHS activities.

Figure 1. The number of accumulated COVID-19 deaths in four major countries (September 30, 2021)



Source: World Health Organization (WHO, n.d.).

According to the World Health Organization’s (WHO) statistics released on September 30, 2021, the COVID-19 disease has caused over 4.7 million people globally to have lost their lives (1.1 million on September 30, 2020). As shown in Figure 1, three countries have the highest number of deaths. In comparison, China has demonstrated a noticeable performance in controlling severe cases (WHO, n.d.).

Table 1 and Figure 2 illustrate some of the methods used in the previous research on the models of measuring the OHS performance and their connections with work organization or business performance; they shed light on the conceptual framework developed in this study.

Table 1. Logic model for developing the OHS performance measures

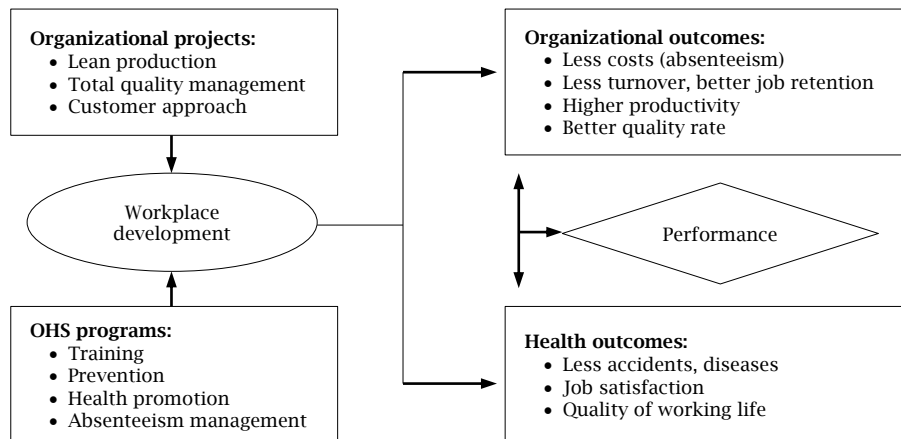
Inputs	Activities	Outputs	Outcomes
Money	Training	Number of staff trained	Reduced sick leave
Staff	Investments	Number of investments undertaken	Higher productivity
Equipment	Maintenance	Number of equipment maintained	Increased profit
Supplies	Interventions	Types of interventions undertaken	Lower liabilities
Facilities			Healthier workforce
			Consistency in performance
			Better performance
			Fewer injuries
			Increased output of goods and services

Note: The selection criteria of performance measures are based on the SMART principle:

- *Specific:* performance criteria should be as specific as possible to make sure it is easy to identify what is being measured.
- *Measurable:* performance criteria need to be measurable either in quantity or by quality, and ensure stipulated goals are met.
- *Achievable:* unrealistic goals may cause disease within an organization. However, the challenge of goals that stretch an organization a little may be beneficial.
- *Relevant:* the performance measurements should be relevant to the organization’s overall mission and the strategic objectives of any program.
- *Time-based:* the performance measurements should be achievable within a specific period.

Source: Gervais et al. (2009).

Figure 2. Integrating work organization and the OHS programs



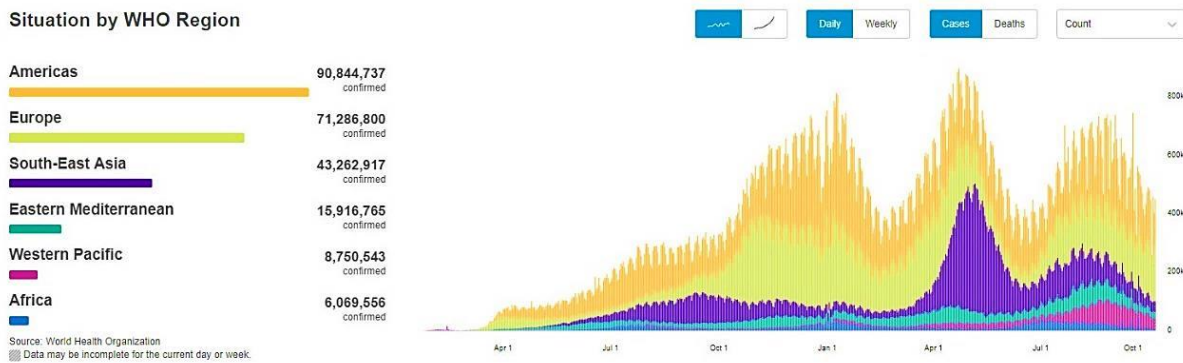
Source: Hesapro (2013) based on De Greef and Van den Broek (2004).

The alternative methods for conducting the research are expected to be quantitative analysis, such as econometric regression analysis, to assess the exact relationship between OHS management activity factors, such as incidents, training, and system implementations, and key business performance indicators, such as workers’ productivity, revenue or value, and investment return. However, this method depends on the availability of significant sample sizes of chosen variables to test the significance of associated parameters.

4. THE IMPACT OF COVID-19 ON GLOBAL MACROECONOMIC DEVELOPMENT

Among the six world regions, the Americas, Europe, and South-East Asia are the leading groups of economies that have experienced a significant amount of COVID-19 illness and death cases. As of July 14, 2021, approximately 187.5 million people around the world have been ill or injured to varying degrees due to the spread of the COVID-19 disease. Of the 187.5 million cases, 131.4 million were in the Americas and Europe regions, representing 70.1% of the total number of cases. As illustrated in Figure 3, the number of daily cases is still climbing in waves.

Figure 3. Daily COVID-19 cases in six regions (world), between December 30, 2019, and October 7, 2021

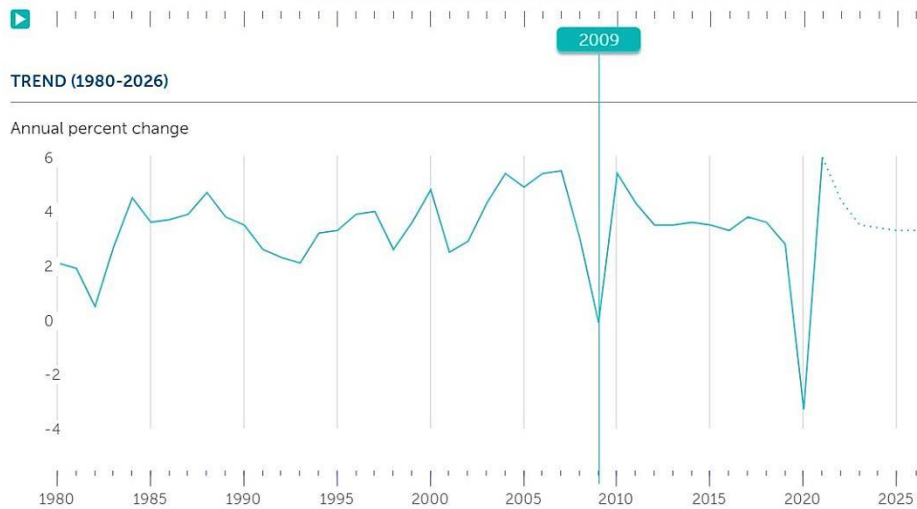


Note: The number of COVID-19 cases is daily reported cases, as opposed to accumulated cases.
Source: WHO (n.d.).

From the historical pattern of COVID-19 cases, the daily number of new cases is expected to climb to a new peak every five to six months, which appears to be in line with the seasonal shift from summer to winter in both northern and southern hemispheres, as the winter season has the high incidence of COVID-19 cases. Hence, the next peak wave of new cases is expected to arrive by the end of 2021, primarily due to the variants of the COVID-19 virus; this is expected to have a significant implication on the gross domestic product (GDP) growth rates between 2021 and 2022.

Having tracked the development of the COVID-19 global pandemic and its impact on the global economy, the consequence is comparable to any historical international systemic risk events, such as the 2014 European debt crisis, 2007/2008 financial crisis, 1999 dot-com stock bubble burst, 1997 Asian financial crisis, and 1929 Great Depression, to name a few. However, COVID-19 has become the most severe black swan risk event between 1980 and 2020, among all the troughs in the business cycle (Figure 4).

Figure 4. Real GDP growth rates (world), 1980-2021

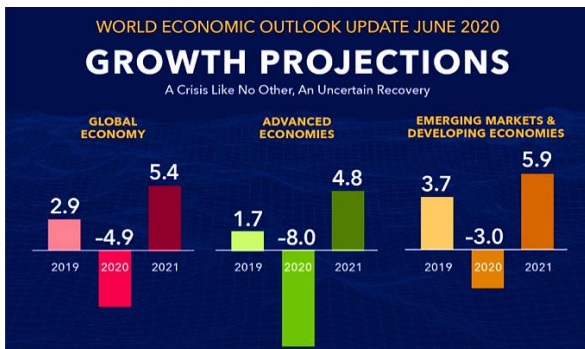


Source: International Monetary Fund (IMF, 2021a).

According to the International Monetary Fund’s (IMF) statistics released in April 2021, the global real GDP growth rate slipped into the deep negative territory (-3.3%) compared to the 2009 situation of only -0.1% growth, as shown in Figure 4 above. However, the prevention of COVID-19’s reoccurrence is key to timely economic recovery, which is expected to rely on the continual releases of new

vaccines and the establishment of the standard medical treatment system to control the impact and probability of COVID-19 incidents. The COVID-19 incident prevention and control measures are expected to be incorporated into the OHS risk management systems at both the industry’s and organization’s levels.

Figure 5. Growth projections by groups of economies (world), 2019–2021



Source: IMF (2020).

In retrospect, IMF made a downwards adjustment in GDP growth rates in June 2020 from its previous release in April 2020; it predicted the global economy to contract by 4.9%, down from the -3% prediction in April 2020. The advanced economies were expected to contract by 8% and the emerging and developing countries were expected to slow down by 3% in 2020, as illustrated in Figure 5. The actual data of real GDP growth rate (-3.3%) in 2020 turned out to be better than expected (-4.9%), which was primarily attributed to better than expected performance in emerging and developing countries, as revealed in the charts above and below. These countries are reported to have weathered through the global pandemic by successfully controlling incidence.

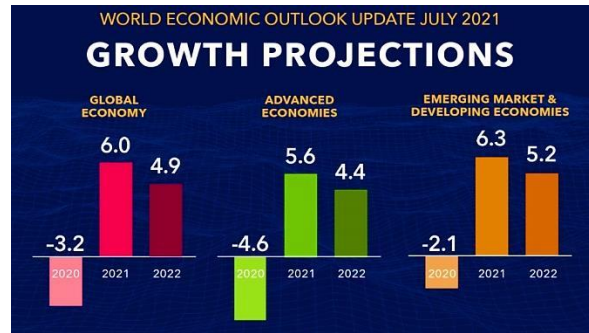
Figure 6. Growth projections by economies (world), 2020–2022



Source: IMF (2021a).

As the COVID-19 virus variants remain the concern of global economic recovery, IMF released the GDP growth forecasts in April 2021. The updated outlook reveals an optimistic view for 2021 and 2022 in comparison with its previous forecasts in June 2020, as shown in Figure 6. The optimism largely attributes to the increased availability of vaccines and their effectiveness in preventing severe cases, such as deaths, from occurring. Emerging markets remain the leading group of economies in contributing to global economic recovery (IMF, 2021a).

Figure 7. Growth projections by economies (world), 2020–2022



Source: IMF (2021b).

As shown in the July 2021 update for the global economic outlook (Figure 7), the economic performance of advanced countries is expected to improve between 2021 and 2022 while developing countries are expected to retrieve to a slower growth trajectory. These new projections are largely driven by the COVID-19 vaccine availability and associated fiscal support programs from governments (IMF, 2021b).

As of now, we have witnessed the critical impact of the COVID-19 incidents on global macroeconomic development. The single systematic risk factor has become the dominant driver of business cycles since 2020. However, the dominant effect of the COVID-19 factor is expected to ease up when vaccines are widely available in 2022 and thereafter; the establishment of health and safety risk management systems at both industry and organization levels is crucial in preventing and controlling the probability and impact of illness and death cases.

5. OHS RISK AND CORPORATE GOVERNANCE GOOD PRACTICES ENHANCE ORGANIZATIONAL VALUE

Despite the root of the COVID-19 disease being still under investigation, the first COVID-19 case was officially recorded in China. Since January 2020, the Chinese government has implemented a series of emergency response measures, such as the timely lockdown of Wuhan, barring the entrance to intercity highways, shutting down public gathering places, followed by remote working, monitoring the body temperature in residential communities and public transport systems, and the 14 days' quarantine for international travellers. These risk control measures have effectively blocked the paths of viral transmission and minimized the probability of people's exposure to the disease from other cities. The timely and effective actions taken by the Chinese government prevent COVID-19 from further spreading, which is a good case study in the space of OHS risk management; these good practices are recognized by WHO and some developed countries, such as Japan. Many developing countries, such as South Africa, have referenced the Chinese case in their action against the global pandemic since March 2020.

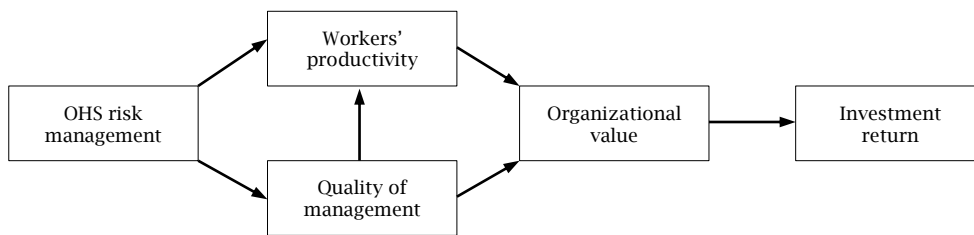
Governments have played a pivotal role in combating the COVID-19 crisis by embarking on a series of monetary and fiscal policies, such as lowered interest rates, business debt and operational expenses backed by governments, and personal living subsidies, among others. Macroeconomic policy measures have been noticeable in the North American region. The Canadian government has disbursed C\$2,000 per month (C\$500 per week) before tax to impacted workers (Gatehouse, 2020), while the US government has granted \$2,400 per month (\$600 per week) before tax to unemployed people (Whoriskey, MacMillan, & O’Connell, 2020). As managers should take the lead in preventing and controlling the OHS risk, everyone in the organization should follow management guidance and proactively manage their own and others’ health and safety, such as social distancing, which is key to achieving the intended effect of policies and guidelines.

Even without the impact of public health and safety incidents, such as COVID-19, many high-risk industries, such as mining, chemical, and construction industries, still experienced frequent and severe incidents in the past two or three years, resulting in the financial loss of hundreds of billions of dollars. In 2015, the cost of work-related injuries, illnesses, and deaths was approximately between 2% and 5% of the European GDP, such as Finland, Germany, the Netherlands, Italy, and Poland, according to the European Agency for Safety and Health at Work (n.d.). From the perspective of corporate social responsibility, with the widespread lockdowns and social distancing, COVID-19 has exacerbated the negative impact of OHS incidents on labour productivity and business performance and has fostered the continued search for better root-cause solutions to these incidents.

From the perspective of enterprise risk management and corporate governance, risk prevention management systems and action plans are key to reducing the probability and severity of incidents. After the occurrence of incidents, the corporate governance focus should be on the timely and effective implementation of emergency response measures to minimize the severity of incidents. No matter what kind of consequence is caused by potential incidents, they should be given equal attention, because negligible, hidden dangers often lead to serious incidents over time. Organizations should truly integrate OHS into the daily operation of their enterprise risk management systems and treat OHS as an important element for enhancing employees’ productivity. As to listed companies, the progress of continuous improvement should be recorded in detail as part of their annual sustainability reporting processes.

Similar to the fact that the root causes of incidents are often neglected or difficult to find during the incident investigation process, many organizations fail to realize that employees’ productivity is capped by the OHS management. It is a common practice that human resource management systems and performance appraisal methods link directly to the business activities of a firm and its financial statements. However, employees’ health and safety are not on top of business agendas at many organizations. Such negligence in corporate governance is the root cause of employee productivity that reflects not only the number of hours worked but also the quality of work; the resulting quality of work reflects the quality of OHS management.

Figure 8. OHS risk management as an underlying factor of value and return



Note: The arrows mean the left (bottom) factors impact the right (top) factors.

The quality of OHS management is one of the main factors that impact workers’ productivity (O’Donnell, 2000; Gahan et al., 2014). As OHS management is part of enterprise risk management, it reflects the quality of management; the latter is a critical factor that impacts organizational value and investment return. At the same time, the enhanced productivity of employees has a natural, positive effect on organizational value and investment return, as shown in Figure 8. Therefore, in the context of ongoing COVID-19 cases and its negative impact on macroeconomic and microeconomic development, a conceptual framework that demonstrates the contributing factors and the transmission mechanism between

the OHS activities and organizational value is crucial, which is the focus of the next section.

6. RESEARCH RESULTS

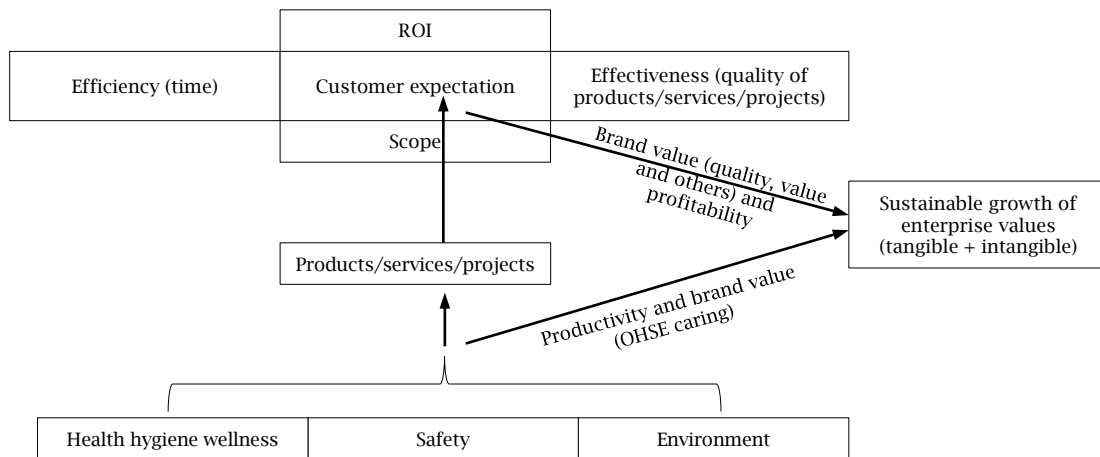
With hundreds of millions of preventable and treatable incidents occurring every year, there is a lack of clear strategy for unpacking the core drivers of significant injuries, fatalities, ill-health cases, and productivity losses. The situation is exacerbated by the COVID-19 global pandemic where health and safety incidents increased dramatically since the beginning of 2020, according to the statistics from WHO. OHS management system has become a systematic and integrated approach to comprehensively and proactively managing business

interruption risk and associated costs (Parkinson, 2013). The management system is an integral part of a company's daily operating activities and contributes to business performance and GDP (United States Agency for International Development [USAID], 2012). However, the OHS risk management is expected to transform from a conventional command-and-control and compliance-oriented model to one focusing on stakeholder management and value (Weitner & Hatler, 2013). Numerous studies have testified to the relationship between OHS and positive, tangible, and intangible business outcomes. However, the measurement of business values attributed to OHSMS lacks solid evidence.

6.1. A conceptual framework that connects OHSMS, productivity, quality, and organizational value

As a strategic tool for enhancing the standard and effectiveness of organizational OHS practices and outstripping minimal regulatory requirements, the conceptual framework uses an integrated OHSMS, which incorporates core, interrelated factors that impact the multiple elements of OHS, as illustrated in Figure 9. It enables the simultaneous prevention and mitigation of incidents and enhances the health, hygiene, safety, and wellness in the workplace and surrounding communities; this is imperative in the context of on-going COVID-19 health incidents.

Figure 9. The logical relationship between OHS and organizational value



Note: Return on investment (ROI); occupational health, safety and environment (OHSE).

The conceptual framework also incorporates the factors of key industry, social and economic development trends as follows:

- Changing work patterns. For example, flexible work locations due to mobile technologies.
- Emerging risks. For example, new technologies, such as nanomaterials, biotechnologies, and green technologies deployed in production processes.
- Diversified workforce. For example, ethnicity and age, such as the extension of working life in developed countries and China compared to the younger workforce in Africa.

By incorporating the core value drivers or factors between bottom activities and top-line organizational value, the conceptual framework guides the quantification of costs and benefits associated with the OHS incidents and presents the value proposition of implementing an integrated OHSMS based on the ISO 45001:2018 standard. Value propositions focus on shifting clients' perception from cost-and-risk to investment-and-growth opportunities.

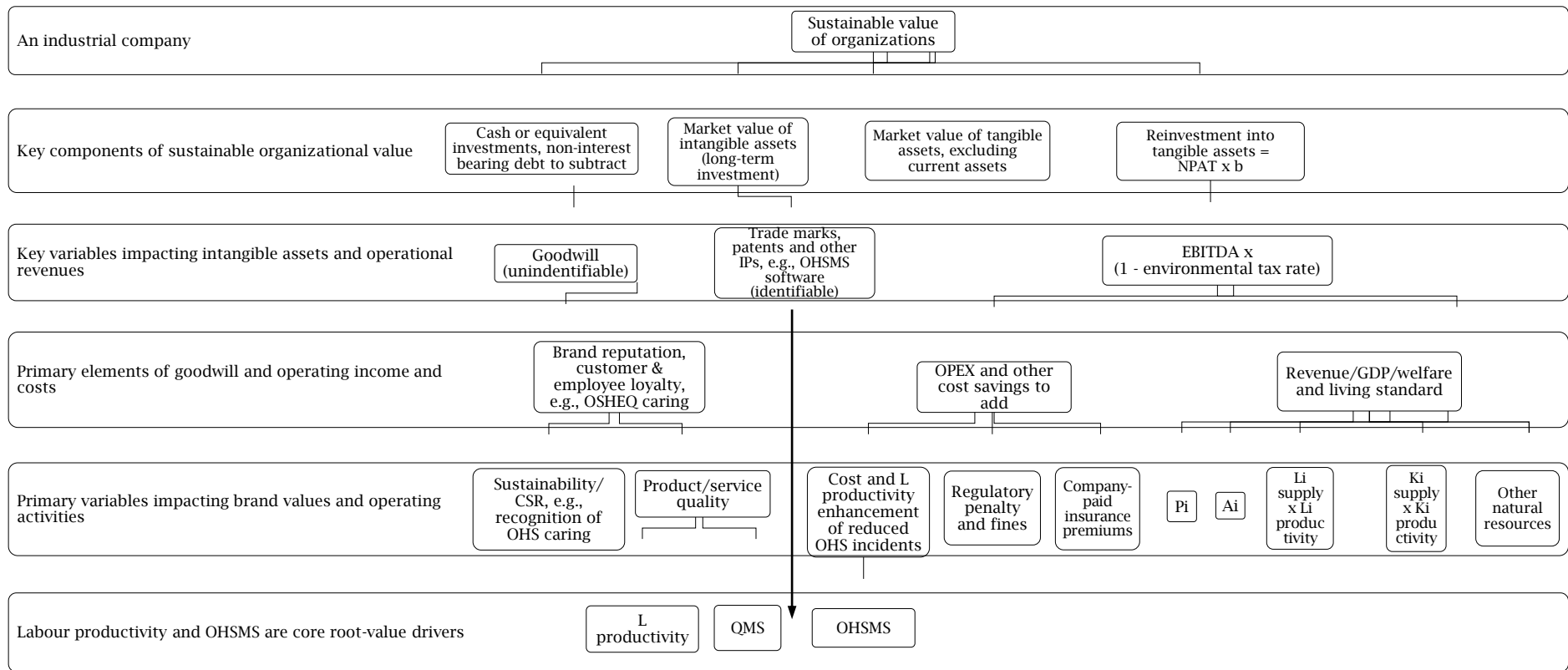
Due to the complex interrelationships among contributing factors, the conceptual framework that consists of three parts as shown in Figures 10, 11, and 13 is subject to the quality of modelling methodology and data used, as there exists an inverse relationship between quality and ROI (Baxter, Sanderson, Venn, Blizzard, & Palmer, 2014). Data and methodology impact output accuracy and objectivity, so the conceptual model initially focuses on factors that are core root-value drivers and incrementally refines the model by adding new

factors. Factor prioritization requires the quantification of the relationships between root drivers and organizational values through robust regression models, which is constrained by the availability of large sample size, data collection cost, such as disease data, and the issues of the subjective self-reporting by employees and employers (Lamm, Massey, & Perry, 2007). Quantification starts from the assessment of fundamental OHS prevention or intervention projects against a set of criteria (Shannon, Robson, & Guastello, 1999). Moreover, the quantification of inputs and outputs in the service and public sectors and the measurement of productivity in a diverse production and service environment is difficult (Gahan et al., 2014).

6.1.1. Part 1 of the conceptual framework: Bottom-up approach to sustainable organizational value

As shown in Figure 10, the conceptual framework identifies the underlying transmission mechanism between organizational value and the root-value drivers, such as labour productivity and OHSMS, by connecting the dots between increased labour productivity, reduced costs, innovation, and continuous improvement. The transmission mechanism increases the tangible financial profitability and the intangible asset value of organizations. In 2014, approximately 80% of S&P 500 companies' market capitalization was attributed to intangible assets, which increased to 90% in 2020 (Ali, 2020).

Figure 10. Part 1 of the conceptual framework: Bottom-up approach to sustainable organizational value



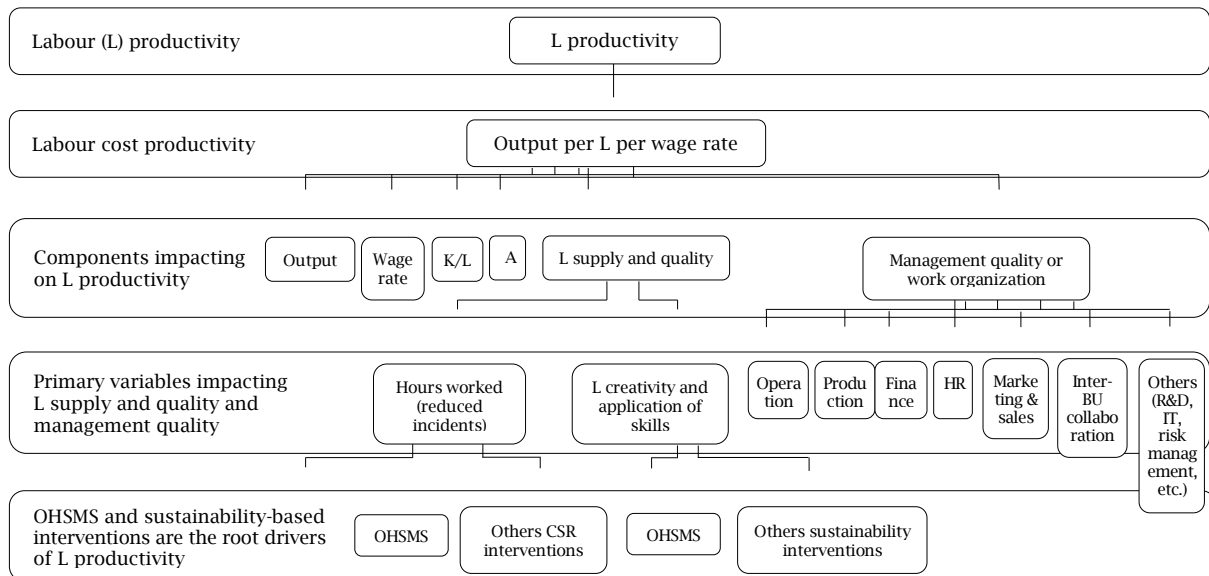
Note: IPs: intellectual properties; Pi: price per product/service/project line; Ai is total factor productivity per product/service/project line and includes primarily technology growth and efficiency, for example, human capital knowledge (more intangible than labour (Li) and physical capital (Ki)). NPAT: net profit after tax; EBITDA: earnings before interest tax depreciation and amortization; OPEX: operational expenditure; b: retention ratio; QMS: quality management system; OHSEQ: occupational health, safety, environment, and quality. Assumptions: Pi remains constant to strip out the effect of business cycles. Comparisons of company performance are within the same industry to strip out the effect of the industry structure on companies' pricing power.

The core contributing factors of the bottom-up approach to sustainable organizational value start from workers' health and its relationship with safety behaviour (a major factor of workplace incidents), which then connects with other factors that impact the OHS performance in the workplace. The environment and quality aspects refer to the causes and effects of the OHS incidents, which connects the dots between the OHS intervention/performance, productivity, customer satisfaction, and organizational value.

6.1.2. Part 2 of the conceptual framework: Factors impacting labour productivity

The second part of the conceptual framework unpacks the labour productivity factor, which is one of the root-value drivers in part one of the conceptual framework. As illustrated in Figure 11, OHSMS is one of the root drivers of labour (L) productivity.

Figure 11. Part 2 of the conceptual framework: Factors impacting labour productivity



Note: Total factor productivity (A), for example, enhanced equipment design taking into account ergonomic factors; cross-business unit collaboration is horizontal. K/L: physical capital per labour.

The following are the primary elements that underline OHSMS and workers' productivity factors, respectively.

OHSMS

- Compensation to victim workers for tangible and intangible financial, physical and psycho-social costs, as illustrated in Figure 12 below.

- Training influences the workers' perception of risks, for example, safety climate and behaviour. Other interventions include, for instance:

- reintegration and rehabilitation from the return of work-related accidents to minimize the intangible physical and psychological consequences of accidents on workers;
- improved productivity, namely reduced absenteeism and presenteeism;
- talent retention and acquisition;
- areas not directly related to healthcare costs but workers' general lifestyle and behaviour issues, such as nutritional programs, according to Orchard (2015).

- Risk-prevention culture: collective underlying values, beliefs, assumptions, and norms that shape workers' behaviour and the unique psycho-social environment of the workplace (Weitner & Hatler, 2013).

Worker productivity

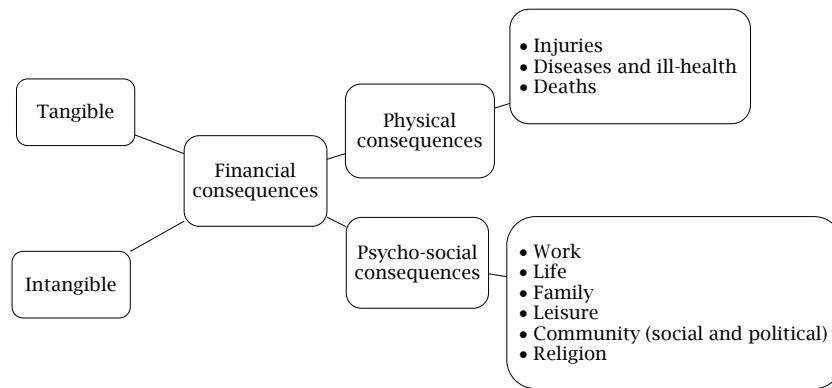
- Labour quality: skills, health and morale by investing in education, training, and culture awareness.

- Management quality or work organization: systems and practices, such as occupational hygiene that enhances the quality of work-life, improves working conditions, the effectiveness of work practices, and worker's performance (physically, emotionally able and have a desire to work) (O'Donnell, 2000; Gahan et al., 2014). For example, work-life balance, workplace accessibility, workplace interventions of OHSMS, and operational management (OHSMS, procurement, supply chain, enterprise resource planning, and customer relationship management, among others).

6.1.3. Part 3 of the conceptual framework: Cost-benefit analysis of the OHSMS investment project

From the perspective of the cost burden, as illustrated in Figure 12, although employers bear more financial losses than employees (millions vs. hundreds of thousands), employees bear the financial, physical, and psycho-social consequences of incidents, especially those intangible elements, such as bad brand image, presenteeism, and low morale; this results in lost business opportunities and customers, which are far more severe than those borne by their employers.

Figure 12. Consequences of the OHS incidents



The employee-borne costs eventually pass onto employers and the economy (Hrymak & Pérezgonzález, 2007). Hence, the focus of OHSMS is on workers and identifies the root causes of costs

and benefits, which guides companies in deploying effective solutions to enhance workers’ productivity, brand value, and consequently national GDP.

Table 2. Consequences of work-related accidents and ill-health

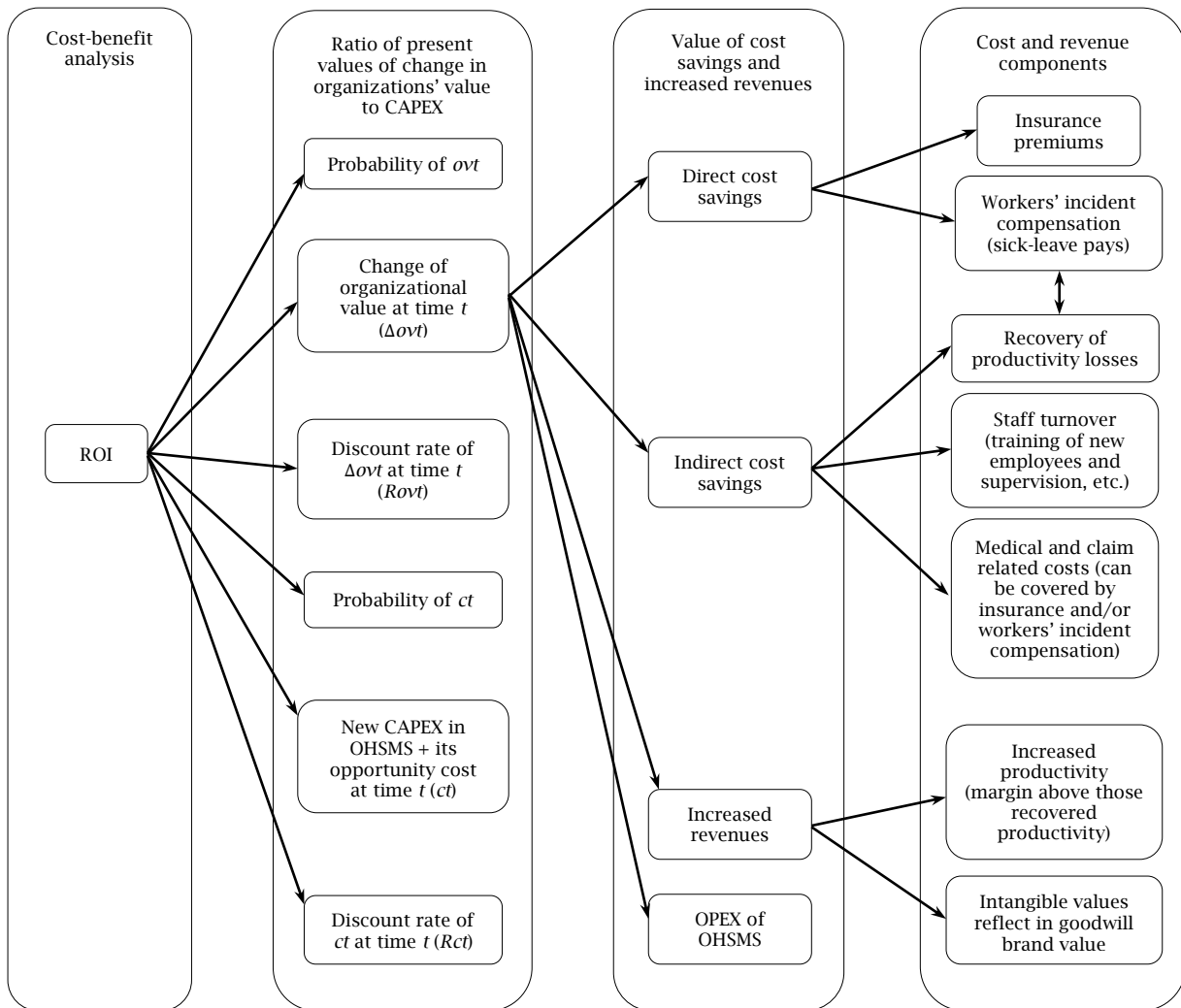
<i>Parties affected</i>	<i>Non-tangible consequences</i>	<i>More or less tangible consequences</i>
Victim	Pain and suffering Moral and psychological suffering (especially in the case of a permanent disability) Lowered self-esteem, self confidence Strain on relationships Lifestyle changes	Loss of salary and premiums Reduction of professional capacity Medical costs Loss of time (medical treatments)
Family and friends	Moral and psychological suffering Medical and family burden Strain on relationships	Financial loss Extra costs
Colleagues	Psychological and physical distress Worry or panic (in case of serious or frequent accidents/cases of ill-health)	Loss of time and possibly loss of premiums Increase of workload Training of temporary workers
Company	Presenteeism (employees are present at work but limited in their job performance by physical and/or mental problems) Company image Working relations ad social climate	Internal audit Absenteeism Decrease of the production Damages to the equipment, material Quality losses Training of new staff Technical disturbances Organizational difficulties Increase of production costs Increase of the insurance premium or reduction of the discount Early retirement Administration costs Legal sanctions
Society	Reduction of the human labour potential Reduction of the quality of life	Loss of production Increase of social security costs Medical treatment and rehabilitation costs Early retirement Decrease of the standard of living

Source: De Greef, Van den Broek, Van Der Heyden, Kuhl, and Schmitz-Felton (2011).

From the perspective of tangible and intangible costs, Table 2 demonstrates the five main work-life parties that incur the OHS incident cost, namely victim workers and their families, friends, colleagues, employers, and society. The cost to each party consists of both tangible and intangible costs, which could be controlled through OHSMS.

As illustrated in Figure 13, the third part of the conceptual framework lists the key cost and benefit components used for calculating the ROI associated with implementing the OHSMS project.

Figure 13. Part 3 of the conceptual framework: Cost-benefit analysis of the OHSMS investment project



Note: CAPEX stands for capital expenditure. Time $t = 0, 1, 2, \dots, n$. Probability is the most likely scenario or for multiple scenarios to generate multiple ROIs — a conservative approach would require a high discount rate, $R_{ct} < R_{ovt}$, low probability of ovt , and high probability of ct . The decision for implementing the OHSMS project depends on whether the absolute value of $ROI \geq 1$. However, in practice, it is the companies' discretion to deploy OHSMS if ROI is only marginally smaller than 1 but with a significant improvement in the OHS targets, such as zero-fatality and zero-harm.

With a significant sample size, the ROI conceptual framework (Figure 13) guides the quantification of the costs and benefits of OHSMS and overcomes the following challenges:

- Employers tend to overestimate implementation costs and underestimate the OHS incidents and associated costs.
- Cause-effect relationships between OHSMS and organizational values are not straightforward.

More importantly, there are unlimited soft returns that are immeasurable or unidentifiable but strengthen the organizational value in the long term, for example, the return of employees' morale, customer loyalty, brand reputation, and the perception of communities and workers' social circle on the organization's OHS culture.

In comparison to other types of investments, the outcome of behavioural change and the ROI in the OHS intervention programs, such as employee assistance, coaching and mentoring, and health assessment, take a longer time to realize (Parkinson, 2013).

6.2. Result discussion

The framework helps organizations better understand the costs of the OHS incidents, the benefits of the OHS intervention strategies, and the associated return on investment in the OHSMS projects. In the case of COVID-19, the conceptual framework starts by monitoring the root-value drivers of organizational value and labour productivity impacted by public health hazards, which triggers the train of thoughts in conducting factor or principal component analysis and cost-benefit analysis. However, the selection of contributing factors, the determination of significant relationships among factors, and the accuracy of measurement contribute to the accuracy of the ROI calculation associated with the OHSMS projects. To achieve sustainable organizational value and growth, value chain partners are expected to follow similar OHSMS standards, which enhances the accuracy of the conceptual framework's output by cross-referencing data and composing factors among value chain partners.

The attribution of the bottom operating activities to top-line values or cost savings remains a challenge when several initiatives are implemented concurrently (Lamm et al., 2007). This requires more sophisticated mathematical and statistical models and methodologies, such as Monte Carlo Simulation (factor analyses) and decision tree analysis (project analysis), to improve robustness and output accuracy.

7. CONCLUSION

The benefits of managing the health and safety of employees are often invisible to the naked eye, let alone OHS has a complex relationship with public health incidents, such as the COVID-19 global pandemic. Understandably, organizations are not willing to take more responsibility for the well-being of workers, because individual wellness strongly correlates with public health and private living. Though not only could the health and safety of employees help companies reduce unnecessary financial losses associated with health and safety, but it also indirectly affects employees' ability to innovate, the quality of products or services, and the competitive advantages of organizations (Sun, 2018). The OHS risk management requires strong and positive leadership and the OHS-oriented organizational culture, which projects an enduring impact on employees' behaviour and enables workers to proactively participate in managing OHS, instead of passive compliance with regulations.

There are numerous studies on the positive relationship between OHS, productivity, and organizational value. However, there is a lack of solid evidence for quantifying various interrelated factors contributing to productivity and organizational value. The study focuses on developing a conceptual framework by incorporating core value drivers and linking the OHSMS upstream to the organization's vision, top-line financial performance, and brand value. Moreover, positive OHS culture and the effective OHSMS embedded in core business processes, where both managers and workers take individual responsibility, contribute significantly to business performance (Institute of Directors in New Zealand [IoD] & Ministry of Business, Innovation & Employment [MBIE], 2013).

The conceptual framework underlined by a dynamic transmission mechanism links bottom OHS interventions with top-line organizational value. The framework also unpacks the primary components of productivity and OHSMS and guides the cost-benefit analysis, which aims to identify root-value drivers and lays the foundation for quantifying the relationship between root-value drivers, productivity, and organizational value.

The more advanced the OHSMS is, the more satisfied organizations are with their business performance. However, a balance between system advancement and labour productivity is essential (Fernández-Muñiz et al., 2009).

Although the ROI of most OHSMS use cases is positive, more convincing business cases increase ROI resulting from the improved cost-efficiency (time) and cost-effectiveness (quality) of the OHSMS interventions in organizations of different sizes, industries, and risk profiles (scope). Due to the potentially adverse impact on workers' well-being and productivity of pursuing the highest performance work system, the level of OHS

protection does not necessarily correlate positively with ROIs (Gahan et al., 2014). A balanced scorecard approach is a good alternative to measure the outcome of OHSMS; the forward-looking method takes into account both tangible and intangible organizational values, for example, assessing the value of OHSMS to the sustainable value of organizations.

All in all, it is critical to realize that the financial cost of managing today's health and safety risk is limited, but in the future, it could generate inestimable, intangible assets and tangible investment returns for employers, in addition to the tangible cost-saving on insurance, wage, training and other direct expenses. The OHS management connects workers' productivity with the value of organizations by equipping managers and leaders with the right systems and tools to enhance the quality of management, which leads to heightened organizational value and investors' return. IoD and MBIE (2013) state positive OHS culture and effective OHSMS are embedded in core business processes where both managers and workers take individual responsibility to have a significant contribution to business performance. Hence, the key to achieving the objective of connecting workers' productivity and organizational value via OHSMS is to shift organizations' perception from voluntary compliance with OHS regulations to the proactive adoption of good practices.

As one of the research gaps uncovered in the literature review, there is a lack of solid evidence to testify to the relationship between business performance and OHSMS activities. Empirical evidence on which the conceptual framework is based relates to the on-going COVID-19 global pandemic and associated economic impact. As an early development work on this topic, the study addresses the relationship between organizational value (a form of business performance) and the OHS activities (a representation of OHSMS) through a conceptual framework and associated bridging factors. However, the research has not focused on gathering the evidence to verify and quantify such a conceptual framework and associated contributing factors. The development of a quantitative model that generates concrete and accurate ROI case by case requires sophisticated mathematical and statistic models, sufficient sample data, and advanced analytics applications; this is outside the scope of this study and requires further research.

As the quantitative analysis of workers' productivity, management's quality, organizations' value, and investors' return is outside the scope of this research, the study recommends future areas of research by conducting an empirical analysis on the relationship between OHS activities and productivity, quality, value, and return, respectively. Further research is expected to focus on the empirical analysis by gathering historical data to test the hypothesis that the OHS management in the COVID-19 global pandemic does not lead to increased organizational value and investment return. Multivariable regression analysis is expected to be a practical tool to quantify the relationship between OHS and labour productivity and the quality of management, respectively. These studies are expected to measure the specific relationship between the OHS activities and organizational value and investment return.

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