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Socially Responsible Operational Performance Industry 4.0 Framework Related to the Role of the Government in Health Device Producers

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Abstract

Because of the continued high volume of health product imports, followed by high government expenditure on imported health products, and strong government efforts to drive increased capacity of production of local health devices, it promotes increased production and technology support to domestic health device producers. The importance of producer performance, combined with the support of the latest technology Industry 4.0 towards domestic products that benefit the people and reducing state spending on imported products, would provide direction to producer in terms of social responsibility operational performance as part of the process of expanding the scope of use of health facilities for Indonesians. The objective of this study is to create a framework for Socially Responsible Operations Performance (SROP) as a new framework in the new normal era by emphasizing the need to adopt advanced Industry 4.0 technology in order to improve the operational performance of producers in the production of domestic health devices, as well as to boost government efforts to improve the use of local material components in the Indonesian health device industry. This is a qualitative study of two domestic health equipment manufacturers. The data were gathered through interviews with each company's director, who were asked questions about the topic of the study. Based on the interview with the directors, it can be concluded that the SROP framework can be applied to Indonesia's condition, and the two factories under investigation are prioritizing three essential technologies—AI and IoT—in addition to 3D printers in order to boost manufacturing output.

Keywords: Socially Responsible Operations Performance, Health Device Manufactures performance, Government Role, Industry Technology 4.0

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1. Introduction

The current situation involves a high level of health product imports, high government spending on imported health products, and significant government efforts to increase the capacity for producing local health devices, including increasing production and technology in domestic health device producers. These factors all point to the need for improvement in the front, i.e., in health device producers' performance. The primary issues are related to increasing the manufacturing of health devices with a high domestic component contribution in Indonesia. The country's current health device producers should be improved with medium and high technology. With reference to the Ministry of Health issue, it was discovered that low-tech health equipment adoption continues to dominate the addition of new firms (Teguh, 1 April 2022). During the global Covid-19 outbreak, medical equipment like fans and oxygen generators became uncommon. Nearly all nations safeguard their industries to ensure that their goods are prioritized over those needed domestically. In light of these circumstances, the Indonesian government is committed to utilizing the innovations carried out by universities and national research organizations to guarantee that the country's health device business can progressively meet domestic demands. The actions taken include the adoption of laws aimed at supporting the home healthcare market, large government expenditures on imported medical supplies, and concerted efforts to boost manufacturing capability. according to the National Industrial Development Master Plan 2015–2035, one of the key industries (Arifin, 8 September 2022).

In order to reduce state spending on imported goods and increase the amount of time that the Indonesian people can spend in health facilities, it is necessary to evaluate the significance of producer performance in conjunction with the support of cutting-edge technology, particularly Industry 4.0 technology. Based on this assessment, producers' performance is operationally responsible for social responsibility. The goal of socially responsible operations performance, or SROP, is to manage social issues (such as safety, human rights, and working conditions) inside an organization's internal operations and those of its top supply chain partners (Hoejmose, 2013; Touboulic, 2015; Zorzini, Hendry, Huq, & Stevenson, 2015). SROPs have always been challenging to quantify and monitor. John Nikolakis and Krishnan (2018). Retail merchandising planning was disrupted by an instance of strong demand for a certain product and a change in customer purchase patterns during the epidemic. The production techniques used in the industrial sector in Indonesia have been negatively impacted by the ongoing conditions there, which also provide challenges with regard to raw materials and supply. The retail situation is getting worse due to a lack of containers in international supply chains. (Sunardi, Soenandi, Ginting, Timotius, & Sabini, 2022). In light of Indonesia's current crisis, supply chain management is dependent on risk management, resource reconfiguration, and supply chain adaptability (Ongkowijoyo, Sutrisno, Teofilus, & Hongdiyanto, 2020). The usage of medical devices and medications, particularly in remote places, has been a national concern from the year 2000 until the year 2022. The COVID-19 epidemic is making disorder worse, and poor sales techniques, insufficient regulation that exacerbates business-related issues, and economic considerations are to blame for the drop-in sales. Rising raw material prices and issues with foreign export supply chains have a significant impact on Indonesia, a country that imports 90% of its raw materials and medications. (Dewi, Maret, & Lesmana, Tenando, 2022). One well-known controversy that has caused

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developed and developing nations to place a greater focus on social responsibility is the Rana Plaza collapse case report in Bangladesh (Jacobs, 2017). According to related literature, social responsibility can be broadly categorized as a means of preventing internal social failure and enhancing the well-being of the community (Huq, Chowdhury, & Klassen, 2016; Klassen & Vereecke, 2012; Yawar, 2017). This conceptualization of social performance reflects both internal and external social practices.

Organizational Social Responsibility (OSR) and Community Social Responsibility (CSR) are the two main sub-themes that make up Socially Responsible Operations Performance (SROP). The three sub-themes of employment practices, health and safety, and business practices are all included in the theme of organizational social responsibility (OSR), which considers all social practices that are centred on suppliers and employees. (Professional Conduct). These three sub-themes, which are explained in terms of descriptions, illustrations, and examples that can be connected to the performance of health device manufacturers, contain indications that support or function as a result of Industry 4.0 technology. Social indicators like workplace diversity, human rights, job satisfaction and quality, child labour, and flexible work schedules are the main emphasis of employment practice (Bai & Sarkis, 2010; Huq, Chowdhury, & Klassen, 2016); (Mani, et al., 2016) (Marshall, McCarthy, Heavey, and Mcgrath, 2015). An anticipation of the number of health and safety incidents (Bay, Orzes, & Sargis, 2022; Houq, Chhowdhury, & Klassen, 2016; Mania, et al., 2016) and other social indicators of new types of health practices and emerging health and security practices, such as reducing the spread of traditional health and health security for new occupational diseases, are examples of how social indicators of health and safety practices are put into practice. Business practices incorporate social indicators that centre on supplier relationships via supplier growth and management strategies to guarantee fair margins, anti-corruption and bribery measures, and ethical procurement standards. The supplier ethics sub-theme also addresses concerns including paying supplier workers fairly (Huq, Chowdhury, & Klassen, 2016; Mani, et al., 2016; Marshall, McCarthy, Heavey, and Mcgrath, 2015). (Baumann & Botta-Genoulaz, Chardine-2014).

The theme of community social responsibility (CSR) encompasses social practices that take place outside of organizations. It falls under the impact on health and community improvement, and is divided into three sub-themes: welfare and economic growth (Economic Welfare and Growth), social governance (Social Governance), and quality of life and social well-being (Quality of Life and Social Welfare). The effectiveness of health device manufacturers can be linked to the indicators of support or function of Industry 4.0 technology provided in descriptions, pictures, and examples for each sub-theme.

Public health and safety are examples of social indicators that are used to measure quality of life and social well-being. Other indicators include public welfare, training, and the social impact of goods and services that businesses provide. Organizations can lessen their negative social footprint by focusing on the environment (Bai & Sarkis, 2010). (B€ uy€ uk€ozkan, 2017). In order to make sure that communities are supported in successful initiatives and have influence over decisions through empowerment, social governance incorporates social indicators such stakeholder interactions and corporate social responsibility practices (Bai & Sarkis, 2010; Li,

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2019; Mani, et al., 2016Lastly, social indicators like employment and wealth creation in communities are seen through the lenses of well-being and economic growth, which emphasize the use of local resources, the hiring of local talent, including workers with disabilities, and public investment in the form of social acceptance in general and access to basic services (Chardine-Baumann & Botta-Genoulaz, 2014). (2016) Huq, Chowdhury, & Klassen,.2016).

For global organizations to sustain or grow their competitive advantage, adopting digital technology as the application and support of cutting-edge technology in advancing performance and performance has become a business necessity (Upadhyay, Mukhuty, Kumar, & Kazancoglu, 2021) (Verbeke & Hutzschenreuter, 2021). By producing goods using environmentally, socially, and economically sound processes, Industry 4.0 technology can be combined with corporate social responsibility (CSR) initiatives to promote sustainable development and value creation. This helps organizations operate in an ethical and sustainable manner. As they use Industry 4.0 technology for moral and sustainable operations, developing country industries confront finance, awareness, and knowledge gaps. In order to bring about change in the industrial world at large and to raise employee knowledge of the function and contribution of this technology, government support—rather than merely top management—is essential (Asokan, Huq, Smith, & Stevenson, 2022) (Kumar, 2020) (Shinde & Kasat, 2021).

According to some, the development of socially conscious corporate practices can be facilitated by the fourth industrial revolution (Bienhaus & Haddud, 2018). 2017; Wellener et al., 2019; Morrar, Arman, & Mousa, 2017). backed a number of digital technologies that allow for the creation of industrial added value and dissolve physical borders (Andre, 2019; Davison & Malone, February 2020). Industry 4.0 was first conceptualized in Germany with the goal of improving German companies' industrial capacities. Arman, Morrar, and Mousa (2017). It has been demonstrated that using Industry 4.0 technology has positive operational effects, such as increased competitiveness and productivity. Wellener and associates, 2019). In order to preserve or increase their competitive edge, businesses everywhere now need to implement the newest digital technologies (Upadhyay, Mukhuty, Kumar, & Kazancoglu, 2021) (Verbeke & Hutzschenreuter, 2021). Adopting cutting-edge digital technology also has the advantage of addressing social challenges in intricate supply chains through increased transparency and tracking via features like data persistence, traceability, proof of origin, and real-time data exchange (Cole, Stevenson, & Aitken, 2019; Friedman & Ormiston, 2022; Nikolakis, John, & Krishnan, 2018). Numerous industries, such as construction, oil and petrochemicals, and mineral resources (Yuan, Qin, & Zhao, April 2017; van den Brink, Kleijn, Tukker, & Huisman, 2019; Oesterreich & Teuteberg, 2016), have tested a range of Industry 4.0 technologies. However, there is a dearth of information regarding the integrated industry's adoption of Industry 4.0 technologies, particularly when considering social sustainability (Cole, Stevenson, & Aitken, 2019; Zorzini, Hendry, Huq, & Stevensons, 2015; Helmi, 2021). Thus, the ways in which these technology advancements can be used to enhance Socially Responsible Operation Performance (SROP) are currently not well understood (Bai, Orzes, & Sarkis, 2022; Kamble, Angappa, & Gawankar, 2018; Morrar, Arman, & Mousa, 2017). To enhance particular facets of SROP, industries should be aware of which ones to use Industry 4.0 technology (Beltrami, Orzes, Sarkis, & Sartor, 2021 August) (Cole, Stevenson, & Aitken, 2019) (Paul, 2021). In order to

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comprehend how industry 4.0 technology might improve SROP by limiting the adoption of undesirable social effects, it is necessary to further study the implications of industry 4.0 for SROP.

In order to improve the operational performance of organizations involved in the production of domestic health devices, producers must adopt and utilize advances in Industry 4.0 technology. This will support government efforts to improve the use of local material components (TKDN) in the Indonesian health device industry. The proposed SROP framework (figure 1) has never been tested in Indonesia especially in the health device industry. That is why the goal of this research is to apply a framework for Socially Responsible Operations Performance (SROP) as a new framework in the New Normal era.

2. Method

This research is a qualitative research design. Applying the SROP-Industry 4.0 framework (Figure 1) does not require the intervention on the research object, therefore the method used is historical and longitudinal case studies, which is an exploration study, to study the events of the present, past and dig phenomena studied by an organization, in this case the health device producer.

The data collection is done by using the interview technique. The interview will be conducted by the researcher as the interviewer and one person as the source (Director). The interview technique is carried out through six stages, namely: a.) identifying the research problem or phenomenon to be investigated; b.) developing the design of the interview covering the interview question and the interview protocol; c.) conducting interviews against the source; d.) transcription and translation; e.) analysis of the data of the interviews; and f.) reporting. The topic of the interview deals with framework for Socially Responsible Operations Performance (SROP) as a new framework in the new normal era by emphasizing the need to adopt advanced Industry 4.0 technology. The new revised framework were proposed based on the directors' answers. Implementation of data collection and answers from the interview results, in April and May 2024.

The research population is the domestic producer (factory) of health devices, PT ATMI Solo and PT. ATMI IGI Centre, which is governed by the Bakti Karya Surakarta Foundation which has a Unit of Karya and Unit of Entrepreneurship. The unit of Karya includes higher education institutions including the field of education vocational study (Diploma and vocational high school), which concentrates on vocational education in manufacturing (industrial machinery) in Indonesia that adopts the dual system education model of Germany and Switzerland. This ISO 9001:2000 quality assurance has been obtained since September 21st, 2001 and its implementation is regularly audited every year. Standard upgrades to ISO 9001:2008 were implemented on May 18th, 2010 under certificate numbers 01 100 075858 and 01 100075859. The enterprise unit, includes the PT. ATMI Solo and PT. ATMI IGI Centre. Sample of this research is the director of each company, since he plays a major role in policymaking and technological solutions. The size of the sample for this study, consider the following two things: a.) the amount of sample required to saturation or repetition. This is the amount that is required

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in the research, in order to be able to identify a pattern or pattern that is consistent in the data; b.) The size of the sample to represent the variation of the target population, is how large a sample is needed to assess the difference or variance of the group studied.

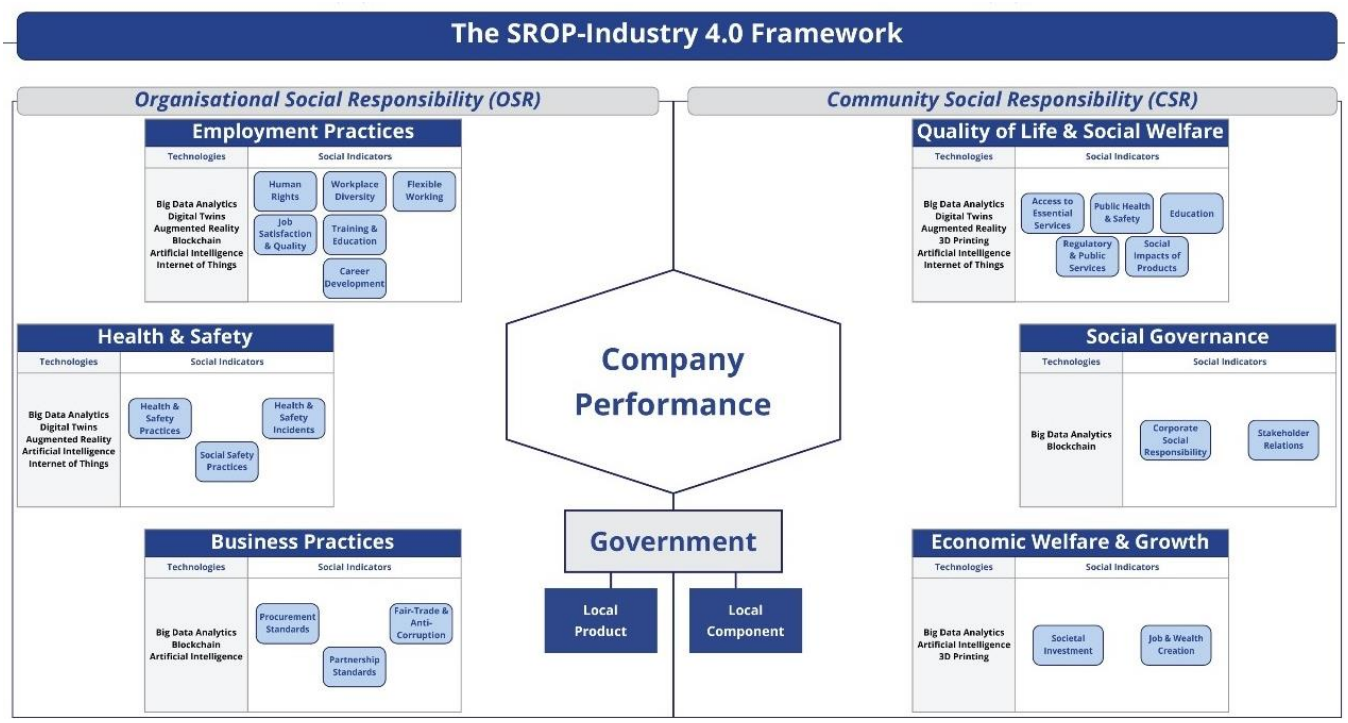

Figure 1. The SROP Framework (Asokan, D. R., 2022) Tested for this Research.

3. Results

The 2 directors from PT ATMI Solo and PT. ATMI IGI Centre were interviewed answering the question related to the framework. Their answers are as follows

Question to assess support for Industry 4.0 technology for each OSR indicator

How can BDA support detect wage gap, overtime work without pay/incentive?
1. There is no BDA technology support to detect this gap. Various employee data and HRIS support applications to assess salary strata, overtime, incentives already exist
2. Not until the use of BDA technology, a lot of data is available and managed including company profit sharing, BDA is part of the future technology support plan.

How can blockchain technology support detect unethical code of conduct violations by suppliers?

1. The mechanism of the procurement process is still not supported by Blockchain technology in assessing an unethical or irrelevant condition with the supplier.

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2. There is no support for Blockchain technology in monitoring the code of conduct in the process with suppliers.

How can the BDA support assess and close age, ethnic and gender gaps?

1. The gaps are not measured on the age, ethnicity & gender data of employees in the HRIS application, the HRD manager plays an important role in this assessment.

2. There is no BDA in the assessment of age, ethnicity & gender.

How can AI support use data on the diversity of the talent of each employee?
1. There is no special AI to assess the diversities of the employee's talent.
2. There has been no AI technology support for this, against the existing employee data mapping.

How is Digital Twins support able to improve the efficiency of work processes through mapping production facilities, stockpiling, short-range processes of damage cases, maintenance and logistics?

1. Production processes are technology of communication between machines, including machine maintenance and there are applications stock bar warehouse (barcode stock logistics) 2. Digitalization is a process that will be done, toward efficiency & productivity of work processes in the field of production.

How does Augmented Reality support play a role in training and job placement, in providing satisfaction, improving the quality of work and retaining employees?

1. There is no AR technology to carry out assessment, job placement, satisfaction, quality of work & employee retention. There's HRIS application support for this.

2. The current phase is not structured. New simulations happen at the engineering level.

How is AI support capable of supporting administrative/repetitive tasks, so that employees work more effectively to the process towards decision-making & quality of work?

1. AI support for the process of improving the quality of work applied to computerized programs and algorithm programs on high-tech production machines, though not all of them.

2. The direction towards digitalization, as part of the strategy for automation

How does augmented reality support play a role in improving the quality of employee training?
1. There is no AR support for improving the quality of employee training. Assessment is still being done by the manager on the various available data.
2. There will be the direction of AR, to improve the quality of training of practices with machines, etc.

How does Artificial Intelligent support play a role in training, creating a digital mindset and driving increased corporate profits?

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1. AI in the form of machine-technology sophistication and in the training syllabus, to support the manufacturing process, including creating digital competence with the object of AI itself, aimed at the end of the company's profit.
2. Will lead to AI to support training and education as part of digitization, aiming to support corporate profit.

How can Augmented Reality support processes where technicians work outdoors, meet online, and work from home (WFH)?
1. There is no special application, AR supported from each employee's mobile phone in support of work communications when in different locations (Work from home, etc.)
2. One of the company's investments is, machines that can be monitored from their source, when in a different location, including if there are process errors/damages.

How the Internet of Things support plays a role in the relevant and informed real-time production process at the factory, even if the employees are outside.

1. IoT support in workshop planning in Manufacturing Applications.
2. IoT technology support has not been used 100%, still the process is pioneered to not depend on person to person, aimed at productivity up & efficiency up.

How can Big Data Analytics support training records and performance records support employee performance management on vacant positions, job rotation, and skills development?

1. There is no BDA support for assessing employee career development, the database is available in the Human Resources Information System application.
2. In the HRD section, there is employee skill matrix data, for mapping the gap and skill up will look like or how managed by Human Resources Department.

How can Big Data Analytics support, based on past event data, play a role in predicting/anticipating the potential point of an accident, reducing the risk of an incident and the severity of an occupational accident?

1. There is no specific BDA support to regulate occupational safety matters. Setup based on machine safety component technology. Health and safety data is available on the HRIS application.
2. Important technical inputs in the design of workflow processes and production machinery. Because an accident at work is already too late to be prevented anymore.

How is Digital Twins' support of real-time simulations, able to help identify the cause/source of the problem for correction and reduction of incidents?
1. There is no comprehensive Digital Twins support to set up employee health & safety related problem detection, correction and incidents. The settings are still based on the technology of each machine. The data is available in the HRIS application.

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2. Technical inputs become important in the design of workflow processes, real-time simulations, including the setting up of production machines. Because an accident at work is already too late to be prevented anymore.

How can the Artificial Intelligent support of health and safety data, be used to identify and analyse undetected incidents, aimed at improving health and analysis of root cases to management?

1. There is no AI support for pre-incident identification and case root analysis, related to health and safety. The data is available in the HRIS application.

2. Technical inputs become important in the design of workflow processes, including the setting up of production machines. Because an accident at work is already too late to be prevented anymore.

How does the Internet of Things support employee health data, say the ability to detect body temperature through cell phones to prevent health incidents and raise awareness amongst the people around them?
1. IoT support during the pandemic uses its own factory machines, for employees' body temperature detectors, disinfectant spray sensors, hand wash sensors and the exploitation of government-owned COVID-19 applications related to vaccine programs and free medicines. Employee health data is available in the HRIS application.
2. During an intense pandemic.

How does Big Data Analytics support tracking the risk of infectious diseases through contact peak, travel, health history, for the prediction, anticipation and follow-up needed?
1. There is no specific BDA technology support in support of tracking the risk of infectious diseases in employees, and so on. Available employee health data in the HRIS application.
2. Not directly and not specifically analysed. Take advantage of the various existing applications.

How can Augmented Reality support play a role in working from home, guiding the production process and informing knowledge from a distance?
1. No Aug. Reality specific support for remote work instruction/production process guidance.
2. Technical arrangements important for workflow and production machines, including remote guidance & instruction.

How do you support the Internet of Things devices in real time, such as detection of the fever condition of the employee on the site, before entering the office?
1. IoT support during the pandemic uses its own factory machines, for employees' body temperature detectors, disinfectant spray sensors, hand wash sensors and the exploitation of government-owned COVID-19 applications related to vaccine programs and free medicines. Employee health data is available in the HRIS application.
2. Using a body temperature sensor machine, a disinfectant spray sensor, a hand washing machine sensor.

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How does Block chain support for detection, transparency from the beginning to the end of supply chain processes, especially on critical products, reducing the presence of corrupt and/ or counterfeit products, supporting audits, compliance with ethical codes and future performance evaluations?
1. There is no special support for Block chain technology in detecting supply chain processes from the beginning to the end. Available applications still require monitoring, analysis, and human decision-making based on data from all supply chain processes.
2. Material quality inspection, as one of the stages of the supply Chain detection process.

How does the support of Big Data Analytics in the efficiency of procurement spending process aim at reducing costs, automation, staying flexible, improving compliance and being controlled?
1. There is no BDA-specific technology support in evaluating the efficiency of purchasing processes. Applications still require human analysis & decisions.
2. A lot of available data, considerations and decisions are fixed from human (Management)

How does Big Data Analytics support to assess the credibility of suppliers as a positive indicator for starting / continuity of cooperation, before being contracted by vendors?
1. There is no BDA-specific technology support in assessing cooperative sustainability processes in supply chain processes. Applications still require human analysis and decisions.
2. A lot of available data, considerations and decisions are fixed from humans. (Management)

How does Artificial Intelligent support in analysing the identification of sustainability conditions, supplier transparency in reducing sustainability risks and improving supplier compliance?
1. There is no AI-specific technology support, in identifying sustainability conditions & supplier transparency. Applications still require human analysis & decision.
2. There is Accurate Application support, with the role of finance assessing and deciding supplier credibility.

How does Blockchain support the transparency of supply chain processes, such as searching the value chain to ensure that profits are distributed fairly and evenly?
1. There is no support for Blockchain technology in evaluating transparency in supply chains processes related to searching value chains. These indicators are mainly from the analysis and management of finance.
2. Human factors (management) still dominate, from finance and logistics.

Question sentence to evaluate support for Industry 4.0 technology for each CSR indicator
How does 3D printer support play in designing, printing many kinds of products, producing products, including critical products, and saving processes, compared to conventional factory processes?
1. There is support for 3D Printing technology as a machine to produce prototypes of non-metal/non-metallic materials.

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2. The 3D printing machine is highly functional in support of product prototyping, speeding up time to market and detecting errors as soon as possible.

How is IoT device support to improve the quality of infrastructure inspection and hazardous areas without human presence and function, also to identify security issues?
1. There is no IoT technology support specifically for infrastructure inspection, hazardous areas, and identification of security factors.
2. No hazard areas. IoT functions are more focused on productivity that is repetitive / has a rhythm (rapid ability process)

What is the role of Digital Twins in improving the quality of SDM, education for prospective employees, assessing job prospects, improving employee creativity and technical skills?
1. Digital Twins technology support for SDM quality management and employee technical skills is not available.
2. Digital twins will be a benchmark for improvement, including the training process. With high initial investment consequences.

How is the role of BDA support to the availability of insight data, real-time prospects for proactive follow-up to the fulfilment of medical needs, hospital beds, Ventilator?

1. There is no BDA technology support to assess the prospects and needs of hospitals in need of alcohol. Only based on information from sales, marketing and distributors.

2. BDA support for this is not available in Indonesia.

How does IoT support improve distribution services, ensure digital delivery tracking, reduce the risk of damage or other risks?
1. There is no special IoT technology support in the supervision of the product delivery process, only coordination and cooperation with external expedition.
2. Cooperation with external expedition.

How does the BDA support the analysis of the process network, to identify possible risks/damages/errors that could have a negative impact?
1. There is no specific BDA technology support to detect negative risks in process flow analysis
2. Towards digitization and automation. There's a signal if it's potentially late or wrong in the production process.

How can Augmented Reality support provide important information to customers, such as the process of product entry?
1. There is no AR technology support to customers on ordered product process information.
2. There is data capturing and monitoring to provide information if timely / late / faster, related to the PPIC section and the credibility role of the company. No direct access to customers.

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How is Artificial Intelligent support integrated into the Quality Assurance system, reducing manual testing, improving test accuracy and low tolerance on product defects, reduced risk of human error, which is important for the production supply chain especially on critical products?
1. There is no special AI technology support to evaluate products with the Quality Assurance system, still much requires human competence.
2. There is still a process of combining man with machine. Leads to AI technology support aimed at increasing value.

How does Big Data Analytics play in tracking, analysing and controlling the impact of meaningful and unnecessary spending/spending processes, aimed at reducing additional procurement costs and re-evaluating suppliers, as well as restoring budgets for community needs?
1. There is no BDA technology support in monitoring the impact of spending processes. There is an application to accurately cooperate with the supply chain in supervision of finance.
2. The forms of budget returns can be in various forms, aimed at increasing productivity and value.

How does blockchain support enable a peak of transparency between organizational partners to avoid disruption, and be able to evaluate partnerships through audits and to enhance strategic relationships with stakeholders?
1. There is no support for Blockchain technology in tracing the transparency trail of partnership processes.
2. Management makes assessments and decisions about partners in terms of vision, mission, credibility, and many other things.

How can 3D Printing support make spare parts or products with fewer machines so that it reduces labour costs, manufacturing functions back in the supply chain to improve local employment opportunities, reduce risk by shorter cycles from the start of design to the market?
1. There is support of 3DPrinting technology in the main function of new product development, making modelling as prototype and dummy, not yet functioning to replace the production machine producing a large quantity of products.
2. The process is still a combination of the human role and the 3DPprinter machine. The role of 3Dprinter is still not doing this absolutely (not 100%)

How does the support of Big Data Analytics and Artificial Intelligent to monitor violations, support law enforcement authorities, identify cases of violations and further design mechanisms for its prevention?
1. There is no BDA and AI technology support that monitors violations, law enforcement to its prevention mechanisms.
2. There is a mechanism of control and inspection between the amount of stock and its connection to existing/no ongoing projects

How is the support of the use of Artificial Intelligent in testing and assessment of health problems that may arise/risk to the surrounding community?

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1. Do not use AI technology to take care of things that could be dangerous to the surrounding community. The waste is measured in the lab, there is a third-party to take care of its disposal, and the rest of the manual work instructions and human observation
2. Up to now no waste is produced that is dangerous to the community around, minimizing the noise pollution generated by machines that have a continuous rhythm.

4. Discussion

Understanding the connections between corporate social responsibility (CSR) and financial performance of businesses depends heavily on qualitative research. The underlying themes and patterns that support the effectiveness of CSR activities and their influence on corporate performance can be found through this kind of research. A 2023 study examined corporate social responsibility (CSR) activities in Saudi Arabia's service industry and discovered that implementing CSR measures enhances business success.

Qualitative research can be utilized to create a framework for socially responsible operations performance (SROP) in the context of the Indonesian health device industry. In the new normal period, this framework can be used to improve operational performance and support government initiatives to use more locally produced material components (TKDN). Industry 4.0 technologies, like artificial intelligence (AI), the internet of things (IoT), and 3D printers, can greatly increase manufacturing productivity and aid in the creation of new goods.

The report emphasizes how crucial it is to give AI and IoT technologies top priority in order to assist production equipment since they improve automation and efficiency. Additionally, by producing prototypes and dummy designs, 3D printing technology can aid in the development of new products. Although mass production has not yet been employed for these devices, their potential to transform product design and development processes is considerable.

A thorough examination of the perspectives and experiences of manufacturers in the domestic health device manufacturing industry is made possible by the qualitative research methodology. This can offer insightful information on the potential and difficulties these companies have while implementing and using Industry 4.0 technologies. Understanding these elements enables the SROP framework to be modified to meet industry-specific requirements and assist government efforts to encourage the use of regional components.

The SROP framework is a new approach that integrates social responsibility into operational performance, focusing on the impact of socially responsible practices on business outcomes. The study aimed to explore how this framework could be applied in the health devices production industry, which is critical to the country's healthcare system.

According to the study, in order to increase production, the two producers gave priority to two important technologies: artificial intelligence (AI) and the internet of things (IoT). The productivity and efficiency of the production equipment were increased by the integration of these technologies. Furthermore, 3D printers were employed in the development of new items, enabling the production of prototypes and dummy designs.

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The study emphasized the significance of Industry 4.0 technology adoption in the medical device manufacturing sector. Two key technologies—AI and IoT—along with 3D printers are the ones being emphasized by the two factories under examination in order to increase manufacturing output. Artificial intelligence and the Internet of Things help factory machines in a big way. The operational performance of manufacturing machinery was greatly enhanced by the integration of AI and IoT, allowing the manufacturers to create high-quality goods with more efficiency.

The technology of the new 3D printer machine serves as new product development in this case to manufacture a prototype/dummy a new product design; 3D printing machines have not yet served as machines to produce items in large quantities. Using 3D printers to develop new products has also shown potential for boosting competitiveness and creativity.

5. Conclusions

The potential of the SROP framework to improve operational performance in the Indonesian health device production business illustrated by this qualitative research study, can be applied with Indonesia health device producers. But eventually not all the Industrial 4.0 technologies owned by this2 companies. AI and IoT in particular—have been proven to be essential for increasing production productivity and competitiveness. The industry's potential for innovation and expansion was also demonstrated by the usage of 3D printers for the development of new products. The results of the study offer significant perspectives for policymakers, industry participants, and factory managers to improve the operational efficiency and competitiveness of the Indonesian healthcare device manufacturing sector.

The recommendations of the study underscored the necessity for the Indonesian government to persist in endorsing the use of Industry 4.0 technologies within the health device manufacturing sector. This assistance might take the form of supplying manufacturers with resources and training to modernize their technology as well as pushing the creation of domestic material components (TKDN) to lessen dependency on imports.

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