“Defense industry business performance model in developing countries”

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DEFENSE INDUSTRY BUSINESS PERFORMANCE MODEL IN DEVELOPING COUNTRIES

Abstract

The defense industry is vital to supporting a country's defense, especially in the modern era. While many emerging and developing countries are capable of producing military goods and services domestically, they remain dependent on foreign inputs to varying degrees. Yet, several studies have examined factors that can affect the self-reliance of the defense industries in developing countries. Therefore, the present study aims to examine factors that can explain business performance variation of defense industries in developing countries. It investigates further the business model innovation mediation for the first two factors of business performance. Data have been collected from 70 defense industrial companies in Indonesia. The Partial Least Squares-Structural Equation Modeling method is used to analyze the impact of high-performance work systems, technological innovation, and business model innovation on the business performance of industrial companies. The results show a significant effect of implementing High-Performance Work Systems and Technological Innovation through Business Model Innovation on Business Performance (accounted for R2 = 0.67). The research findings are expected to encourage defense industries in developing countries to focus on implementing human resource practices and adopting new or improved technologies and research results at all levels of management following business model adjustments.

Keywords human resource practices, innovation, self-reliance, competitive advantage, business model, partial least squares

JEL Classification F52, L21, M54, O32

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INTRODUCTION

The state of self-reliance in the defense industry means that a country's defense industry can design and produce military goods and services domestically across the spectrum of needs for its armed forces without limiting foreign technological inputs. This industry has been recognized as an essential instrument for developing the strength of the national defense system and even for supporting national economic growth and innovation in many countries. Not only developed countries, therefore, but many developing ones, including Indonesia, also are increasing their ability to develop and maintain their domestic defense industry. Even though the results are promising, in many cases, developing countries have only been positioned as consumers of weapons produced by industrial countries. Yet, several studies have explored factors that impede or increase the aspect of the independence of the defense industry.

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1. LITERATURE REVIEW AND HYPOTHESES

The defense industry (also called the military industry) consists of government and commercial industries that are involved in the research and development, production, and services of arms and military facilities. Although the establishment of defense industries in most developing countries was based on political and national strategic motivations, government commitment and protection are consistently implemented strategically in their industry development blueprint (Benoit, 1978). However, many countries are aware of the importance of industrial and managerial innovation application in their defense industries (Montratama, 2018; Iskandar et al., 2019; Reis, 2021; Béraud-Sudreau et al., 2022). Therefore, since 1970, the Indonesian government has initiated a self-reliance policy and conducted processes towards the state of independence in defense industries that include import substitution, capital goods-led industrialization, and defense offsets (demands for reciprocal investment related to procurement (Maharani & Matthews, 2022). The Indonesian defense industry base is currently dominated by nine specialized state-owned companies with 105 small private-sector firms. These companies allow Indonesia to produce arms domestically, own several licensed productions of foreign-designed arms, provide maintenance, repairment, and overhaul services, and even have an export right for some foreign-designed arms and be able to sell several abroad (Béraud-Sudreau et al., 2022). Even though the results are promising, similar to cases of many developing countries, Indonesia is still one of the biggest consumers of weapons produced by developed countries (Béraud-Sudreau et al., 2022).

In the era of postmodern industrialization, the critical factor of an independent (strong and independent) defense industry, like any other industry, is sustainable business performance (Tseng & Lee, 2014). To improve performance, every company creates a set of competitive strategies that determine how the company will compete, what goals to achieve, and what policies to make (Porter, 1997). Every competitive strategy must be directed to deal with emerging social and technological challenges to achieve sustainable business performance (Haseeb et al., 2019). On the other hand, Obradovic (2016) shows that every competitive advantage cannot be separated from innovation, such as a company that fails to innovate can result in reduced competitiveness. Therefore, the present study explores factors that influence business performance. This study focuses on aspects related to innovation, such as (1) High-Performance Work Systems, which is related to changes in human resource practices; and (2) Technological Innovation, which is associated with adopting new or improved technology and research results.

The theory of high-performance work systems is premised on human resources practices affecting business performance through employee attitudes (Rasheed et al., 2017). Evans and Davis (2005) show that adopting the theory can be done through flexible work assignments, self-managed teams, staffing, communication, decentralized decision-making, compensation, and training. Meanwhile, Min et al. (2018) pointed out that the change in the management practice by establishing good employee-manager interactions can enhance employee attitudes and individual and organizational performance. The rules have positively influenced employee satisfaction, engagement, outcomes, and well-being (Ananthram et al., 2018). This element of high-performance work systems capability enhancement, motivation, and opportunity is expected to create a unique pool of human resources that competitors will find difficult to imitate or replace (Chowhan, 2016). It provides a necessary platform for employees to enhance their participation in decision-making, increase their motivation, and improve their knowledge, skills and abilities to carry out their tasks, which in turn is aimed at improving organizational performance (Wang et al., 2019). At the same time, the same platform can provide media to increase employee enthusiasm for learning and work to promote openness to innovation (Zheng et al., 2020).

Spies (2014) defines Technological Innovation as transforming a new idea or scientific discovery into standard practice. Technology innovation ensures the continuity of developing new and improved theories, concepts, models, and advanced products. Innovation is the acceptance of an idea by the market. In line with this, Lu and You (2018) viewed that advance defense technology plays a critical role in safeguarding the national security interests and its development. Technological

Innovation can be used as a set of processes, facilities, and skills with improved service products or processes created and offered to the market and society (Jemala, 2015). Mastery of technology is a process to reduce or eliminate technological gaps (Giuliani et al., 2016). Any companies with strong capabilities in technology, research, and development will become market leaders and have better opportunities to maintain their competitive advantage, which can be seen in two dimensions: product technology capabilities and process technology capabilities. According to the definition from OECD/Eurostat (2018), product innovation refers to a new or improved product or service that is significantly different from a company's previous product or service and has been introduced to the market (OECD/Eurostat, 2018). While, process innovation is defined by OECD/Eurostat (2018) as a new or improved business process for one or more business process functions that are significantly different from the previous business processes and have been used by the company (OECD/Eurostat, 2018). On the one hand, product innovation presents new challenges in manufacturing, which includes communication, sharing of knowledge, improvement in skills and abilities, competence, risk, and collaboration. On the other hand, process innovation is crucial for increasing company productivity and contributing to efficiency and gross domestic growth (Terjesen & Patel, 2017; Song et al., 2013).

Although the application of high-performance work systems and technological innovation are essential to defense industry companies, the right business model innovation that can support the innovation can deliver them a sustainable competitive advantage (Hamel, 1998). Chesbrough (2007) even pointed out that business model innovation is much more beneficial than simply coming up with new business models or spending money on technology or personnel. In today's competitive marketplace, Business Model Innovation is critical (McGrath, 2010; Sosna et al., 2010). Amit and Zott (2012) have defined Business Model Innovation as a change towards implementing new ideas or ideas that aim to improve or update the components of business model and its influence on the company environment and impact business output. Business model innovation, which consists of four stages, such as adjustment, adoption, improvement, and redesign (Schaltegger et al., 2011), can act as a roadmap for firms as they grow or constructs profitable business model elements, including target customers, product offerings, and value chain industries, and generate rents. It can also be used to re-evaluate what customers want, what the business needs to do to satisfy that demand, and how to turn that desire into profit (Teece, 2018). Moreover, business model innovation is a cycle process and promotes sustainable innovation (Lindgardt & Ayers, 2014). As a process for discovering new business models, it can lead to the reconfiguration of value generation and value acquisition mechanisms (Bjorkdahl & Holmen, 2013). The process triggers a causal effect of the phenomenon because changing just one aspect or component of a company model can result in innovation.

After implementing high-performance work systems methods and adopting technological innovation following the innovation in a company's business model, a way to gauge corporate success is through business performance. The business portfolio component is the main focus of corporate performance measurement (Beamish & Hubbard, 2011). On the other hand, a notion called "business unit performance" is used to evaluate the accomplishments or activities of a business unit. According to Hunger and Wheelen (1993), activities lead to performance. The results of the strategic management process are included. Strategic management is justified by its capacity to raise an organization's performance, frequently gauged in revenue and return on investment. According to this definition, strategic management produces successful business performance. Sales, market expansion, and market share are just a few ways to analyze business effectiveness through marketing the return on investment, revenue mix, asset utilization, and many cost reduction gauge financial performance. Profitability and sales growth are corporate performance indicators (Best, 2013).

The present study aims to examine factors that can affect the business performance of defense industries in developing countries. It puts forward Business Performance as a dependent variable. As mentioned before, the role of Business Model Innovation as a predictor of Business Performance is critical and has been well-established in the field of business management and the reference

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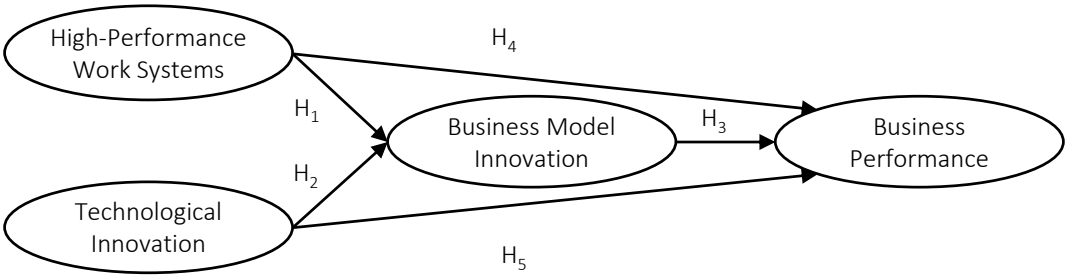

Figure 1. Research framework

disciplines (McGrath, 2010; Sosna et al., 2010; Chowhan, 2016; Teece, 2018; Smajlović et al., 2019; Loon & Quan, 2020). Figure 1 presents the basic conceptual framework underlying the factors explaining the business performance of industrial companies, which forms the basis of this study. Here, the study examines how the indirect effect of Business Model Innovation intervening variables explain the relationship between the Business Performance of defense industries in developing countries with High-Performance Work Systems and Technological Innovation. The following hypotheses are derived from the model:

H1: If the High-Performance Work Systems are partially implemented, it will increase the Business Model Innovation of the Defense Industry.

H2: If Technological Innovation is partially implemented, it will increase the Business Model Innovation of the Defense Industry.

H3: If the Business Model Innovation is implemented partially, it will improve the Business Performance of the Defense Industry.

H4: If Business Model Innovation mediates High-Performance Work Systems, it improves Business Performance.

H5: If the Business Model Innovation mediates Technological Innovation, it improves Business Performance.

The findings are expected to help governments and practitioners related to defense industries (in developing countries) develop strategies that can create a sustainable competitive advantage for them and enhance their business performance.

2. METHODOLOGY

Seventy respondents associated with 70 industrial defense companies in Indonesia were involved in the study. They were pre-selected from October 2021 to January 2022 based on purposive sampling. All defense industrial companies participated in the study are registered with the Ministry of Defense, the Republic of Indonesia. Table 1 presents the demographics of the participants.

Table 1. Demographic characteristics of participants

Characteristics	Sample (*n* = 70)
Age, years, *n* (%)	
20-30	4 (5.7)
31-40	12 (17.1)
41-50	25 (35.7)
50-60	21 (30)
> 60	8 (11.4)
Work Position, *n* (%)	
Head of Department (Director)	43 (61.4)
Manager	20 (28.5)
Head of Section	4 (5.7)
Others	3 (4.2)
Educational Level, *n* (%)	
High School	0
Bachelor Degree	31 (44.2)
Master Degree	30 (42.8)
Doctorate Degree	1 (1.4)
Others	8 (11.4)
Work Duration, years, *n* (%)	
1-6	12 (17.1)
7-12	23 (32.8)
13-18	17 (24.2)
19-24	9 (12.8)
25-30	7 (10)
> 30	2 (2.8)

A tailored questionnaire was developed to measure four constructs in the model: High-Performance Work Systems, Technological Innovations, Business

Table 2. Measurement items of the questionnaire used in this study

Construct/ Dimension	Indicator
High-Performance Work Systems	
Staffing	- Performing selective screening - Conducting technical skill, attitude, and personality assessments - Conducting performance-based promotions
Self-Managed Team	- Having programs to participate in work teams with tasks and decision-making tasks - Having extensive use of work teams across the organization - Having defined tasks - Having decentralized decision making - The intensity level of employee engagement - Having participatory management
Training	- Conducting training for current and future skills - Conducting cross-technical and interpersonal training - Conducting training for new employees and experienced employees
Work Assignment Flexibility	- Having job rotation and cross-team rotation - Having the ability to do the job - Having access to all levels of operation results - Applying the employee suggestion system - Giving an explanation of the business strategy
Technological Innovation	
Innovation Product	- Achievement of effectiveness and efficiency of the production process - There has been a change in how products and services are provided to customers - There are new techniques and tools for quality improvement - There is a better implementation of production methods - There is an increase in production and better product results
Innovation Process	- There is acquisition and training of new skills - Recruiting new employees with new skills - Occurring new quality improvements and implementing new technologies - There is an increase in the production of standardized products
Business Model Innovation	
Value Creation	- The intensity level of training in the company - The intensity level of sophistication and innovation in business processes - The importance level of partnerships in business processes
New Proposition	- The intensity level of work procedure innovations carried out to increase the benefits of the company's products - The intensity level of increasing the effectiveness and efficiency of distribution channels of the company's products and services
Capture	- The level of intensity of innovative actions to improve customer retention and relationships - The intensity degree of developing new income opportunities - The intensity level of production cost savings - The intensity level of adjustment of production costs with prices and market movements - The intensity level of exploiting opportunities through price differentiation
Business Performance	
Financial Perspective	- Having a measure of the intensity level of increased product sales - The intensity level of profitable financing products
Internal Process Perspective	- The intensity level of increasing company profits - The intensity level of interest in the product
Learning and Growth Perspective	- The intensity level of customer complaints decreased - The intensity level of the increase in the number of buyers - The intensity level of product quality improvement
Customer Perspective	- The intensity level of increasing the suitability of target products and market niches - The intensity level of increasing the speed of the financing process - The intensity level of increasing employee satisfaction - The intensity level of increasing the number of employees who have competency levels according to the job position in the company - The intensity level of increasing labor productivity

Note: In column 1, constructs are in bold, while their dimensions are written intended, in regular font.

Model Innovation, and Business Performance. Indicators for each of the constructions' dimensions are shown in Table 2. Appendix A, Questionnaire Items, presents questionnaire items used in the study (translated into English) based on these indicators. Each item is scored based on a 5-point Likert scale, where 1 represents "Strongly disagree" and 5 represents "Strongly agree".

In this study, the PLS-SEM method was employed to examine all relationships of the four constructs, 13 dimensions, and 31 indicators using Smart PLS

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3.2.9. PLS-SEM is an alternative analysis technique using the variance-based Structural Equation Model (Cassel et al., 1999). This approach is chosen because it makes no assumption about data distribution and focuses on the analysis of variance with a small sample size (Hair et al., 2014). The test is carried out in two steps, as suggested by Henseler et al. (2016):

1) to calculate the PLS model and assess the reliability of the outer models, which includes indicator reliability, internal consistency reliability, composite reliability, convergent validity, discriminant validity, and multicollinearity test; and

2) to estimate the direct and indirect effects β of the inner models on the endogenous variable and the degree of explained variance R^2 of the endogenous variables.

The path coefficient β is also used for assessing the mediating effect and the research hypothesis. Hypothesis testing is conducted by analyzing the results of measurements of the structural relationships or the relationships between constructs. To estimate β, nonparametric bootstrapping was used to generate 5,000 samples (Hair et al., 2014). A value of $p < 0.05$ that is associated with 5% error rates of t-values is used to determine the significance of estimates. In addition, a cross-validated redundancy that measures Q^2 or Stone-Geisser test is conducted to assess the predicted validity of the endogenous constructs (Chin, 2010). Based on the test, $Q^2 > 0$ can provide evidence that the observed values are well reconstructed and that the model has predictive relevance. Furthermore, the study examines the effect size (f^2) of each independent variable at the structural level. f^2 with values of 0.02, 0.15, and 0.35 can be considered as a measure for whether a predictor latent variable had a small, medium, or large effect at the structural level, and is assessed by comparing the proportion of R^2 of the latent variable with the R^2 of the full model (Cohen, 2013).

3. RESULTS

To examine the influences within the relationships of constructs included in the model (Figure 1), the study analyzed the five hypotheses depicted in the model. This section presents the results of the latent variable assessment, the direct and indirect effect bootstrapping of the path coefficient analyses, and the hypotheses testing.

As all indicators' measurements and the constructs' dimensions represent the effect of the underlying constructs, all latent variables in this study are regarded as reflecting latent constructs. No missing values were found in the observed data. The latent variables were assessed based on six criteria:

1) indicator reliability;
2) internal consistency reliability;
3) composite reliability;
4) convergent validity;
5) discriminant validity; and
6) multicollinearity test.

In Table 1, the indicator reliability test results show the relationship between indicators is consistent with their construct, which is indicated by the standardized factor loading score $\beta > 0.50$ (Henseler et al., 2016). Whereas the internal consistency reliability and composite reliability tests in which both measure the intercorrelation of indicators from the same construct, result in moderate reliability of all latent variables with Cronbach's $\alpha > 0.60$ (Hair et al., 2014) and satisfactory latent variables with reliability $\rho > 0.70$ (Ghozali, 2015), respectively. The test results of the convergent validity, which gauges how closely one indicator corresponds with other indicators of the same constructs, are also shown in Table 3. With an average variance extracted AVE > 0.50 (Hair et al., 2014), the results show that the construct can capture more than 50% of the variance of its items. The discriminant validity test results are displayed in Table 4 and reveal the distinctiveness of all latent constructs from the other constructs. No indicator has factor loading scores on any other construct higher than the one it measures (Chin, 2010). Finally, Table 5 describes the correlation between constructs (the multicollinearity test) and shows that no multicollinearity problem occurs with the variance inflation factor score of all indicators VIF < 5 (Hair et al., 2014).

Table 6 shows that High-Performance Work Systems (H1) and Technological Innovation (H2) are predictors of Business Model Innovation.

Table 3. Construct reliability analysis results (*n* = 70)

Construct	Indicator	Std. Factor Loading	Cronbach's α	Composite Reliability	Average Variance Extracted
High Performance Work Systems	HPWS1.1	0.911	.918	.932	.582
	HPWS1.2	0.925			
	HPWS2.1	0.853			
	HPWS2.2	0.863			
	HPWS3.1	0.836			
	HPWS3.2	0.822			
	HPWS3.3	0.911			
	HPWS4.1	0.820			
	HPWS4.2	0.719			
	HPWS4.3	0.918			
Technological Innovations	TI1.1	0.891	.905	.929	.544
	TI1.2	0.876			
	TI1.3	0.714			
	TI1.4	0.793			
	TI2.1	0.792			
	TI2.2	0.639			
	TI2.3	0.860			
	TI2.4	0.861			
	TI2.5	0.732			
	TI2.6	0.698			
Business Model Innovation	BMI1.1	0.798	.915	.929	.527
	BMI1.2	0.895			
	BMI1.3	0.827			
	BMI1.4	0.751			
	BMI2.1	0.858			
	BMI2.2	0.930			
	BMI2.3	0.871			
	BMI3.1	0.802			
	BMI3.2	0.843			
	BMI3.3	0.841			
	BMI3.4	0.768			
	BMI3.5	0.558			
Business Performance	BP1.1	0.816	.897	.916	.503
	BP1.2	0.879			
	BP2.1	0.839			
	BP2.2	0.763			
	BP2.3	0.815			
	BP3.1	0.861			
	BP3.2	0.772			
	BP3.3	0.791			
	BP3.4	0.764			
	BP4.1	0.722			
	BP4.2	0.917			

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Table 4. Discriminant validity results (*n* = 70)

Indicator	High-Performance Work Systems	Technological Innovation	Business Model Innovation	Business Performance
HPWS1.1	0.729	0.482	0.546	0.515
HPWS1.2	0.791	0.606	0.630	0.598
HPWS2.1	0.664	0.567	0.550	0.536
HPWS2.2	0.686	0.505	0.560	0.549
HPWS3.1	0.775	0.413	0.594	0.673
HPWS3.2	0.708	0.465	0.628	0.541
HPWS3.3	0.897	0.659	0.746	0.717
HPWS4.1	0.797	0.353	0.640	0.570
HPWS4.2	0.664	0.694	0.641	0.594
HPWS4.3	0.875	0.582	0.746	0.768
TI1.1	0.691	0.824	0.675	0.756
TI1.2	0.665	0.821	0.654	0.702
TI1.3	0.439	0.576	0.372	0.481
TI1.4	0.490	0.748	0.565	0.539
TI2.1	0.675	0.802	0.758	0.692
TI2.2	0.431	0.642	0.502	0.504
TI2.3	0.375	0.769	0.508	0.486
TI2.4	0.436	0.799	0.587	0.603
TI2.5	0.387	0.693	0.461	0.478
TI2.6	0.489	0.656	0.573	0.493
BMI1.1	0.586	0.432	0.676	0.449
BMI1.2	0.727	0.524	0.769	0.573
BMI1.3	0.586	0.652	0.736	0.618
BMI1.4	0.437	0.613	0.631	0.536
BMI2.1	0.645	0.559	0.783	0.627
BMI2.2	0.750	0.632	0.866	0.703
BMI2.3	0.634	0.630	0.800	0.706
BMI3.1	0.495	0.665	0.725	0.529
BMI3.2	0.615	0.601	0.716	0.668
BMI3.3	0.696	0.717	0.821	0.731
BMI3.4	0.536	0.413	0.657	0.568
BMI3.5	0.423	0.202	0.437	0.310
BP1.1	0.556	0.379	0.533	0.640
BP1.2	0.629	0.660	0.623	0.771
BP2.1	0.607	0.539	0.503	0.798
BP2.2	0.615	0.694	0.684	0.657
BP2.3	0.616	0.671	0.662	0.773
BP3.1	0.670	0.647	0.683	0.816
BP3.2	0.461	0.451	0.465	0.669
BP3.3	0.566	0.648	0.638	0.762
BP3.4	0.506	0.581	0.677	0.615
BP4.1	0.324	0.220	0.351	0.446
BP4.2	0.611	0.541	0.533	0.768

Note: Bold text shows factor loading of indicators on their own construct.

Table 5. Multicollinearity test results (*n* = 70)

Variance Inflation Factor (VIF)							
BMI1.1	1.937	BMI3.4	1.735	TI2.5	2.706	HPWS1.1	2.246
BMI1.1	2.199	BMI3.4	1.914	TI2.6	1.664	HPWS1.2	1.885
BMI1.2	2.753	BMI3.5	1.267	BP1.1	1.715	HPWS1.2	2.727
BMI1.2	3.221	TI1.1	1.587	BP1.2	1.242	HPWS2.1	1.285
BMI1.3	1.962	TI1.1	3.154	BP1.2	1.878	HPWS2.1	1.757
BMI1.3	2.991	TI1.2	4.241	BP2.1	1.242	HPWS2.2	1.285
BMI1.4	1.536	TI1.2	2.966	BP2.1	2.220	HPWS2.2	1.996
BMI1.4	1.674	TI1.3	3.553	BP2.2	1.529	HPWS3.1	1.759
BMI2.1	2.078	TI1.3	1.503	BP2.3	3.237	HPWS3.1	2.826
BMI2.1	2.439	TI1.4	2.217	BP2.3	1.384	HPWS3.2	1.780
BMI2.2	3.099	TI1.4	1.690	BP3.1	1.928	HPWS3.2	2.225
BMI2.2	4.127	TI2.1	2.065	BP3.1	1.446	HPWS3.3	2.308
BMI2.3	2.250	TI2.1	1.894	BP3.2	2.381	HPWS3.3	4.004
BMI2.3	2.712	TI2.2	2.466	BP3.3	1.985	HPWS4.1	1.834
BMI3.1	1.842	TI2.2	1.539	BP3.3	2.882	HPWS4.1	4.467
BMI3.1	2.250	TI2.3	1.868	BP3.4	1.599	HPWS4.2	1.454
BMI3.2	2.241	TI2.3	3.484	BP4.1	2.099	HPWS4.2	2.205
BMI3.2	2.535	TI2.4	3.725	BP4.2	1.603	HPWS4.3	2.391
BMI3.3	2.053	TI2.4	3.337	BP4.2	2.421	HPWS4.3	3.535
BMI3.3	2.913	TI2.5	3.672	HPWS1.1	1.885	–	

Together, they account for more than 76% of defense industries' innovation variance in their business model. Further, the analysis reveals that Business Model Innovation (H_3) is a significant predictor of Business Performance, which accounted for about 67% of the variance in Business Performance between defense industries. The effect size of its relationships with High-Performance Work Systems and with Business Performance are considered as high ($f^2 \geq .35$). In contrast, the relationship between Business Model Innovation and Technological Innovations has a medium effect size relationship ($.15 \leq f^2 < .35$). Overall, the models' predictive significance is supported by the cross-validated redundancy values $Q^2 > 0$. Furthermore, the mediation analysis results in Table 7 show that the relationship between Business Performance and the two independent variables, i.e., High-Performance Work Systems and Technological Innovation, is mediated by Business Model Innovation.

Table 6. Direct effects in the path analysis (*n* = 70)

H	Independent variable	R^2	Q^2	β	t	f^2
Business Model Innovation as the dependent variable		**0.762**	**0.391**	**–**	**–**	**–**
H_1	High-Performance Work Systems	–	–	0.555*	6.477	0.664
H_2	Technological Innovations	–	–	0.390*	4.240	0.329
Business Performance as a dependent variable		**0.671**	**–**	**–**	**–**	**–**
H_3	Business Model Innovation	–	0.323	0.819*	18.334	2.039

Note: * significant $p > 0.05$.

Table 7. Indirect effects in the path analysis (*n* = 70)

H	Independent variable	β	t
Business Performance as a dependent variable and Business Model Innovation as a mediator variable			
H_4	High-Performance Work Systems	0.320*	3.993
H_5	Technological Innovations	0.454*	6.214

Note: * significant $p > 0.05$.

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The results presented in Table 6 and Table 7 support the applicability of the model in Figure 1 in assessing factors affecting the business performance of defense industries in developing countries. Based on these results, the hypothesis tests imply the following findings:

- The analysis shows that High-Performance Work Systems are significantly associated with Business Model Innovation ($p < 0.05$). That is, if there is an increase in High-Performance Work Systems by one unit, it will cause an increase in the Business Model Innovation index of 0.555 units assuming other variables are fixed, thus supporting H_1.

- The analysis shows that Technological Innovations are significantly associated with Business Model Innovation ($p < 0.05$). That is, if there is an increase in Technological Innovations by one unit, it will cause an increase in the Business Model Innovation index of 0.390 units assuming other variables are fixed, thus supporting H_2.

- The analysis shows that Business Model Innovation is significantly associated with Business Performance ($p < 0.05$). That is, if there is an increase in Business Model Innovation by one unit, it will cause an increase in the Business Performance index of 0.819 units assuming other variables are fixed, thus supporting H_3.

- The analysis shows that the relationship between High-Performance Work Systems significantly affects Business Performance mediated by Business Model Innovation ($p < 0.05$). That is, if there is an increase in High-Performance Work Systems by one unit, it will cause an increase in the Business Performance index of 0.320 units assuming other variables are fixed, thus supporting H_4.

- The analysis shows that the relationship between Technological Innovations has a significant effect on Business Performance mediated by Business Model Innovation ($p < 0.05$). That is, if there is an increase in Technological Innovations by one unit, it will cause an increase in the Business Performance index of 0.454 units assuming other variables are fixed, thus supporting H_5.

4. DISCUSSION

The findings of this study indicate that to improve business performance, innovation within an organization is needed, which includes personnel who have good quality and performance, managed by their team, as well as decentralized decision-making, which involves employees, to create participation and communication among employees. The above results of the study are consistent with Becker and Huselid (1998), where a High-Performance Work System combining various practices such as selective recruitment, extensive training, employee involvement, and teamwork will positively affect company performance. Other studies supporting this research have found that High-Performance Work Systems positively affect profitability in small firms (Sels et al., 2006). Concerning implications for management practices, the findings of Min et al. (2018) encourage the development of employee-positive managers to improve employee attitudes and individual and organizational performance.

Likewise, technological innovation shows that to improve business performance, there is a need for innovation within the organization, which includes employees who have good quality and performance, are managed by a team, and decentralized decision-making, involving employees, to create participation. According to Chesbrough and Rosenbloom (2002), new technological innovations require market adjustments and business models. Based on this, technological innovation can continue to develop to create innovation in business models, which will improve the business performance of the defense industry. The above research is supported by Acosta et al. (2018), which investigates the creation of scientific knowledge by top defense industry players and explores the relationship between the traits of big defense enterprises and the creation of various patent kinds (civil, military, and mixed) and technological advancement. Lee et al. (2022) show that the government should increase research and development support to new companies, especially in emerging technological innovation sectors with high technological opportunities, because the government should support expanding research and development on strategic grounds based on industrial evolution theory.

The findings indicate that business model innovation can enhance the overall Business Performance of a company as it is also shown by Gronum et al. (2016). The mediating role of business model innovation between Technological Innovation and Business Performance was in line with Smajlović et al. (2019). In this case, business model innovation can enable strategies to simulate other innovations because it provides a new or significantly improved context for knowledge generation, acquisition, application, and exploitation (Souto, 2015). Further, business model innovation also intervenes in the relationship between High-Performance Work Systems and Business Performance. This might be related to the effort needed to align the human resources practices with the implemented business model and how in turn the practices influence business model innovation (e.g., cases in Nielsen & Montemari, 2012; and Malik et al., 2018). The former is related to the role of human resources in delivering value to the customers and establishing organizational work cultures following the company's business model and plans. On the other hand, the latter is when human resources assume their role as mediators of knowledge combinations in financial capital, processes, market and customer demands and expectations, and other types of structural capital. Human resource practices can be the driver of innovation in the business model. Similarly, Holtström (2022) study identified key aspects and business model innovation activities in high-tech industries that leverage transformation strategy.

From a management perspective, the study provides several suggestions. Firstly, defense industries in developing countries need to improve their commercial performance. High-Performance Work Systems can be enhanced by changing employee perceptions, promoting self-managed teams, training, and implementing flexible work schedules. Adopting ideas and knowledge into new or improved products (product innovation) and processes (process innovation) can enhance Technological Innovation. Value creation, unique proportions, and value capture are perspectives that can be taken to enhance business model innovation. Secondly, improving the Business Performance of defense industries in a developing country will be directly correlated with growing business model innovation as an intervening variable. Aspects such as financial perspective, consumer perspective, internal process perspective, and learning and growth perspective should be considered. Finally, expanding the defense industry's capacity for research and development is another action that can be taken. The necessity of mastering military-based technologies through collaboration with advanced defense industry enterprises in other nations and with domestic partners like universities to create an independent, trustworthy strategic defense sector will occur.

CONCLUSION

This study explores the self-reliant aspect of defense industries in developing countries by examining factors that can influence the business performance of these industries. To the authors' knowledge, the study was the first attempt to analyze the impact of high-performance work systems, technological innovation, and business model innovation specifically on the business performance of these industries, and investigate further the intervention of business model innovation for the first two factors to the business performance. Furthermore, although the sample size was relatively small, data collected from local defense industries, in general, was unique due to the sensitive nature of the industries. The test results on the data using the PLS-SEM method have shown the viability of the proposed model for analyzing predictors that can affect the business performance of a developing country's defense industries. The findings of the analysis have provided suggestions and clues for the defense industrial companies, as well as government, as the owner of the main defense industries in most developing countries, concerning their business strategy selection and decision for enhancing the performance of the industries.

The study reveals that high-performance work systems and technological innovation, through the intervening variable of business model innovation, can enhance the business performance of defense sector businesses. Since business model innovation indicates an enterprise's strategic transformation,

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the results show that the two factors, i.e., high-performance work systems and technological innovation, modulate innovative organizational change. In turn, together with the direct contribution of both factors at the individual, group, and business unit levels, all affect a company's business performance. The findings of the study demonstrate the industry's resoluteness in implementing innovative human resource practices and in adopting innovative technologies at the individual, group, and organizational levels to provide a sustainable competitive advantage. The findings also suggest the importance of the triple cooperation between the government, the business world, and universities on research and development related to military industries.

Future work yields for conducting similar research that includes a proportional number of respondents in the government's defense sectors and the national commercial defense industries and explores the impact on each other and each on the national defense industries' performance. Further research can also include financial performance and non-financial performance on company performance factors.

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APPENDIX A

Table A1. Questionnaire Items (Translated from Indonesian to English)

High Performance Work Systems		
Staffing	HPWS1.1	The company is trying to organize its capabilities to achieve high efficiency in the performance of its employees
	HPWS1.2	The company is trying to organize its capabilities to achieve comprehensive capabilities to anticipate future demand
Self-Managed Team	HPWS2.1	The new product development process is directed by technical personnel who have adequate capabilities
	HPWS2.2	The company is trying to organize its capabilities to achieve better team work in the organizational structure
Training	HPWS3.1	The company is trying to organize its capabilities to achieve a standard of a measure of service by developing skills
	HPWS3.2	The company is trying to invest in HR skills to make its HR have high skills and knowledge in the IT field
	HPWS3.3	The company is trying to achieve teamwork by investing in HR skills
Flexible Work Assignments	HPWS4.1	The company is trying to maintain its HR competence by investing in HR skills
	HPWS4.3	Thwe company has better technological knowledge than the company's competitors
	HPWS4.3	The company is trying to invest in HR skills to implement its HR technical capabilities in order to achieve good service
Technological Innovations		
Process Innovation	TI1.1	The company emphasizes the development of new production procedures and methods
	TI1.2	The company emphasizes the introduction of new production methods compared to the company's main competitors
	TI1.3	The company emphasizes the introduction of new production methods compared to three years ago
	TI1.4	The company emphasizes the introduction of new production methods compared to the average of other companies in the same industry
Product Innovation	TI2.1	The company has a high level of product innovation
	TI2.2	The company focuses on modifying existing products
	TI2.3	The company's commitment in the introduction of new products is more than the main competitors
	TI2.4	The company's commitment to the introduction of new products is more than the average company in the same industry
	TI2.5	The company's commitment to the introduction of new products is more than three years ago
	TI2.6	With new products, the company can compete with other companies
Business Model Innovations		
Value Creation	BMI1.1	The company is trying to organize its capabilities to keep up with competitive research and development trends
	BMI1.2	The company intends to develop new technologies in response to changes and customer expectations
	BMI1.3	The company is very effective in the development of new products
	BMI1.4	The company's product development program is more ambitious than the company's competitors
New Proposition	BMI2.1	Companies are trying to invest in HR skills to achieve the polarization of different skills to achieve a competitive advantage
	BMI2.2	Companies are trying to invest in HR skills to achieve the benefits of employees' creative ideas
	BMI2.3	The company has the ability to identify opportunities and investments
Capture	BMI3.1	Companies have different skill capabilities
	BMI3.2	The company has certain (specific) abilities that are sure to achieve superior performance
	BMI3.3	The company has the ability to innovate and the ability to enter new areas
	BMI3.4	The company has the ability to use a variety of communication channels (internally to the organization and to external stakeholders)
	BMI3.5	The company has the ability to reduce service costs
Business Performance		
Financial Perspective	BP1.1	The company retains current customers and manages them to attract new customers (clients)
	BP1.2	The company's reputation in the eyes of customers is increasing
Internal Process Perspective	BP2.1	The company pays attention to the relationship with suppliers (suppliers) very well because the company maintains a sincere partnership with them
	BP2.2	There is mutual trust between the company and the company's suppliers
	BP2.3	The quality of the company's products is above the average of other companies in the same industry
Learning and Growth Perspective	BP3.1	Employee productivity is higher than the industry average
	BP3.2	Employee absenteeism in the company is very rare
	BP3.3	Response time to complaints from customers is quite well above the industry average
	BP3.4	The level of service is better than competitors
Customer Perspective	BP4.1	Companies often initiate the development of new products and technologies
	BP4.2	The products the company produces include high-tech items

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