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Empirical study of human capital management as a knowledge-based strategic asset in building sustainability of public companies in Indonesia

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ABSTRACT

This study examines human capital as a strategic asset in achieving organizational sustainability within the triple bottom line (TBL) framework. It explores knowledge management as a mediating variable and relational capital as a moderating factor. A quantitative approach was employed, surveying 277 companies across 12 industrial sectors listed on the Indonesia Stock Exchange (IDX). Data were collected through structured questionnaires and analyzed using path analysis with SmartPLS software. The results indicate that human capital, knowledge management and relational capital significantly impact organizational sustainability ($p \leq 0.05$). Knowledge management mediates the relationship between human capital and sustainability whereas relational capital does not significantly moderate these relationships. This study reinforces resource-based theory, demonstrating that knowledge-based assets drive competitive advantage due to their unique and inimitable nature. Relational capital's influence on sustainability is more direct rather than moderating while knowledge management plays a crucial mediating role. The findings provide strategic insights for business leaders to optimize human capital and knowledge management for sustainability. Companies should focus on fostering a knowledge-driven culture and leveraging human capital as a core asset while maintaining strong stakeholder relationships to support long-term sustainability.

Contribution/Originality: This study uniquely integrates human capital, knowledge management, and relational capital within the triple bottom line framework examining their combined impact on organizational sustainability in publicly listed Indonesian firms. Unlike previous research, it empirically tests relational capital's moderating role, revealing its limited effect, thus refining strategic sustainability models in emerging markets.

1. INTRODUCTION

The strategy of building sustainability is closely related to the strategy of improving the company's performance in the long- term (Rambaud & Richard, 2015). Sustainability can be built by maximizing the role of strategic resources to achieve optimal company growth or as a competitive advantage following the resource-based theory (RBT) (Acar & Polin, 2015; Kor & Mahoney, 2004). In this case, scholars agree that strategic resources are not fixed assets but knowledge-based assets where the main element is human resources (Andreou & Bontis, 2007; Carmeli, 2004). Thus, the knowledge possessed by company members must be managed properly and correctly to be used as a source of sustainable competitiveness (You, Zhou, & Jia, 2021).

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Measuring human capital as a strategic asset is a hot topic among researchers. Chaharbaghi and Cripps (2006) explained that the role of human resources in improving company performance can be known based on the knowledge possessed which is realized in innovation and creativity so that it functions as a strategic asset for the company. This statement is reinforced by Mention and Bontis (2013) who state that the effectiveness of human resource management as a strategic asset can be known through its role in creating added value for the company, which academics term human capital. Company leaders must understand when and how human capital can be used as a source of competitiveness that is unique, irreplaceable, and not easily imitated by competitors (Barney, 1991; Gerrard & Lockett, 2018; Kryscynski & Morris, 2020). Empirical studies prove that most companies can manage human capital properly and ignore the fact that human capital is an intangible asset that can depreciate (Knudsen & Lien, 2023). Human Resource Management (HRM) is the strategic approach to managing an organization's workforce to maximize employee performance and organizational success. It encompasses recruitment, training, development, performance management, and employee relations, ensuring that human capital is effectively leveraged as a key driver of sustainability and competitive advantage.

This research intends to provide a new concept of a strategy to build sustainability through human capital management as a strategic asset determining competitiveness. For this reason, a leader must have managerial intelligence in solving problems based on knowledge management (Sternberg, 1997; Tung, 2018; Wiig, 1997). According to Cheong and Tsui (2011) knowledge management is an effort to combine various experiences, intuitions, ideas, skills, motivations, and interpretations of individuals involved in the organization. According to Zhou and Fink (2003) some aspects of knowledge management performance include 1) facilitating activities that have to do with knowledge. 2) Building and updating knowledge assets. 3) Utilizing knowledge assets effectively. Thus, the success of knowledge management is in personal knowledge management.

Managing human capital is based on the spirit of being good and the principle of looking good (Sanchez Chaparro, Soler-Vicén, & Gómez-Frías, 2022). Balancing the three pillars of capital, namely people, planet, and profit, through human capital management must be reflected in the company's communication patterns with customers to create a positive image of the company (Ferro, Padin, Høgevold, Svensson, & Sosa Varela, 2019). Empirical studies prove that a positive image is synonymous with public trust which affects profitability and customer loyalty (Gazi, Al Mamun, Al Masud, Senathirajah, & Rahman, 2024) and impacts sustainability (Kim, Jeon, Jung, Lu, & Jones, 2011). This research also places good customer relations as part of a knowledge-based strategic asset termed relational capital in environmentally friendly business practices (Yu & Huo, 2019). The aims and objectives of this research are to test the suitability of the triple bottom line concept in determining business sustainability through the use of knowledge-based strategic assets, including human resources, knowledge management and relational capital. This research examines the differences in sustainability and external drivers across industries, calling for further research into how these drivers impact sustainability strategies and practices in different contexts (Alexander, 2007). The gap in this research is to increase understanding of corporate sustainability and the complex interaction between profitability and sustainable practices through knowledge-based strategic asset management.

The concept of organizational sustainability has been extensively discussed in strategic management literature, often framed within the triple bottom line (TBL) approach which emphasizes balancing economic, social, and environmental capital (Elkington, 1994; Lozano, 2011). However, many studies remain fragmented in their application of this framework, often failing to explore the interplay of knowledge-based strategic assets such as human capital, knowledge management and relational capital in driving sustainability outcomes. Existing research tends to examine these assets in isolation rather than analyzing their combined effects on organizational sustainability (Andreou & Bontis, 2007; Mention & Bontis, 2013). Furthermore, there is limited empirical work on publicly listed companies in emerging economies like Indonesia where sustainability challenges and practices may differ significantly from those in more developed contexts.

Critically, while resource-based theory (RBT) underscores the importance of unique, inimitable assets in sustaining competitive advantage (Barney, 1991) questions remain regarding the operationalization of knowledge-based assets within the TBL framework. For instance, empirical studies rarely address whether relational capital effectively moderates the impact of human capital and knowledge management on sustainability outcomes. Additionally, according to Knudsen and Lien (2023) the long-term effects of human capital deterioration on sustainability performance are underexplored. These gaps underscore the need for a more integrated approach to understanding the strategic value of human and relational capital in fostering sustainability.

This study aims to bridge these gaps by examining the interrelationships among human capital, knowledge management, and relational capital within the TBL framework. This research contributes to the literature in several ways by analyzing 277 companies across 12 industrial sectors listed on the Indonesia Stock Exchange (IDX). First, it provides empirical evidence on the moderating and mediating roles of relational capital and knowledge management, respectively, in achieving sustainability. Second, it offers insights into how knowledge-based assets can be leveraged to enhance organizational resilience and competitiveness in an emerging economy context.

The findings of this study have theoretical and practical implications. For scholars, it bridges gaps in strategic management literature by offering a nuanced understanding of the dynamics between knowledge-based assets and sustainability. This research also provides a robust methodological framework using SmartPLS software, which can be replicated in future studies. For practitioners, the results highlight actionable strategies for integrating human and relational capital into sustainability initiatives, thereby improving long-term organizational performance.

This research aims to contribute to the development of sustainable business practices that not only generate economic value but also align with societal and environmental goals. It lays the foundation for future scholars to explore the complexities of knowledge-based assets across different contexts, industries, and cultural settings.

2. LITERATURE REVIEW

2.1. Organizational Sustainability

Organizational sustainability is a widely discussed concept in management science, often defined as the ability to meet current generational needs without compromising future generations' ability to meet their own (Jose & Chacko, 2017). This concept is operationalized through the triple bottom line (TBL) framework, which emphasizes balancing economic (profit), social (people), and environmental (planet) capital (Elkington, 1994). While the TBL framework has become a cornerstone in sustainability discourse, critics argue that its practical application remains inconsistent. For instance, Lozano (2011) highlights that many organizations fail to fully integrate TBL principles into decision-making processes, often prioritizing profit over social and environmental concerns. This inconsistency raises questions about the effectiveness of the TBL framework in driving sustainability outcomes, particularly in emerging economies where institutional pressures and stakeholder expectations differ from those in developed markets (Alexander, 2007). The literature also reveals a lack of consensus on how to measure and achieve organizational sustainability. Gray (2010) criticizes the oversimplification of sustainability metrics arguing that such approaches fail to capture the complexity of balancing the three capitals. Furthermore, this study addresses a significant gap by providing empirical data on how unique organisational resources, particularly intangible knowledge-based assets contribute to sustainability.

2.2. Knowledge-Based Strategic Assets

Knowledge-based strategic assets, including human capital, relational capital, and knowledge management are increasingly recognized as pivotal to organizational sustainability (Mention & Bontis, 2013). However, much of the existing literature treats these assets in isolation, neglecting the interdependencies that may amplify or hinder their impact. Barney (1991) underscores the value of unique, inimitable resources but provides limited guidance on how

these resources interact in dynamic organizational environments. Similarly, Andreou and Bontis (2007) explore the role of operational knowledge assets but do not consider the moderating effects of relational capital on sustainability outcomes. These studies don't provide a comprehensive framework for comprehending how knowledge management, relational capital, and human capital interact despite their value. According to Knudsen and Lien (2023) a critical issue in this domain is the limited exploration of human capital depreciation over time. While many studies emphasize the strategic importance of human capital, they often overlook the risks associated with skill obsolescence and employee turnover. This gap is particularly pertinent in emerging economies like Indonesia where labor markets and education systems may not adequately support continuous skill development. This study extends the existing knowledge on human capital management as a determinant of sustainability by addressing these limitations.

2.3. Knowledge Management and Relational Capital

Knowledge management (KM) is widely acknowledged as a critical enabler of organizational performance and sustainability (Wiig, 1997). However, according to Barclay and Murray (1997) KM practices are often poorly aligned with broader strategic objectives leading to suboptimal outcomes. The literature predominantly focuses on KM as an isolated practice, overlooking its potential as a mediating mechanism that bridges human capital and sustainability outcomes (Cheong & Tsui, 2011). Furthermore, while relational capital is often highlighted as a critical component of intellectual capital, its moderating role in the context of KM and sustainability remains underexplored. Yu and Huo (2019) note that relational capital can enhance environmental performance by fostering collaboration with external stakeholders but their study does not examine its broader implications for the TBL framework. Empirical research also reveals mixed findings regarding the impact of relational capital on organizational performance. For example, Gazi et al. (2024) demonstrate that strong stakeholder relationships enhance profitability and loyalty but they do not account for how these relationships influence long-term sustainability. This uncertainty highlights the need for further research to determine the specific conditions in which relational capital supports organizational resilience and long-term sustainability.

2.4. Research Gap and Contribution

The existing literature provides valuable insights into the individual roles of human capital, knowledge management, and relational capital but falls short of offering an integrated perspective on their collective impact on sustainability. Additionally, empirical studies often neglect the unique challenges faced by companies in emerging markets, where institutional voids and resource constraints may affect the applicability of Western-centric frameworks like the TBL. This study addresses these gaps by examining the interplay between human capital, knowledge management, and relational capital in the context of Indonesian public companies. This study contributes to the theoretical advancement of resource-based and sustainability theories while also offering practical guidance for managers aiming to improve their organizations' sustainability performance.

3. METHOD

This study employs a quantitative approach to investigate the relationships between human capital, knowledge management, relational capital, and organizational sustainability within the framework of the triple bottom line (TBL). The research design is structured to test the proposed hypotheses through empirical data collection and analysis, ensuring rigor and reliability in the findings. Previous research models focused on managing intellectual capital as a strategic asset in improving organizational performance (Istikhoroh, Lasiyono, & Sukandani, 2024). This sample consent was conveyed verbally at the time of initial data collection. The population for this study consists of 903 companies listed on the Indonesia Stock Exchange (IDX), representing 12 industrial sectors. These companies were selected because they operate in diverse industries providing a comprehensive view of sustainability practices

across various contexts. The Slovin formula was employed to determine the sample size, resulting in 277 companies being included in the study. The Slovin approach is appropriate because it accounts for the desired margin of error and ensures that the sample size is statistically representative of the population. This method enhances the generalizability of the findings while maintaining efficiency in data collection.

Research variables and variable indicators are given in Table 1.

Table 1. Variables and indicators.

No.	Variable type	Name	Indicator
1	Dependent	Organizational sustainability: It is the need of our generation to manage resources to improve the average quality of life that can potentially be shared with future generations (Jose & Chacko, 2017).	1. Social performance (People): The quality of organizational performance is felt directly by *stakeholders*. 2. Environmental performance (Planet): The organization's ability to preserve the environment to maintain *stakeholder* loyalty through various leadership policies. 3. Economic performance (Profit): The company's ability to generate revenue above expenses
2	Independent	Human capital: The added value generated by human resources in performance improvement (Mention & Bontis, 2013).	1. Quality of education: Formal education level 2. Competency: Individual employability that includes knowledge, skills, and attitudes 3. Work experience: Is the field of work that individuals in the previous period have carried out?
3	Intervening	Knowledge management: Managerial intelligence in solving organizational problems innovatively based on science and applying knowledge to build and maintain *competitive advantages* (Sternberg, 1997; Wiig, 1997).	1. Personal knowledge management: A leader's ability to use individual knowledge in organizational wealth. 2. Organizational Structure: The ability of leaders to direct individuals to work according to job descriptions. 3. Brand image: The ability of leaders to build organizational trust with *stakeholders*
4	Moderation	Relational capital: Intangible resources and value-generating capabilities associated with internal and external relationships (Mention & Bontis, 2013).	1. Internal cooperation: Good relationships between individuals within the company. 2. External cooperation: Good company relations with other parties, including the government. 3. Quality of service: The company's ability to provide satisfaction to customers.

Table 1 presents the variables and indicators used in the study on the human capital management system's role in organizational sustainability. This explanation outlines how each variable and indicator functions within the framework of organizational sustainability, linking human and relational capital, along with knowledge management to long-term sustainability goals.

The relationship between variables, namely human capital, relational capital, knowledge management, and organizational sustainability is described in Figure 1.
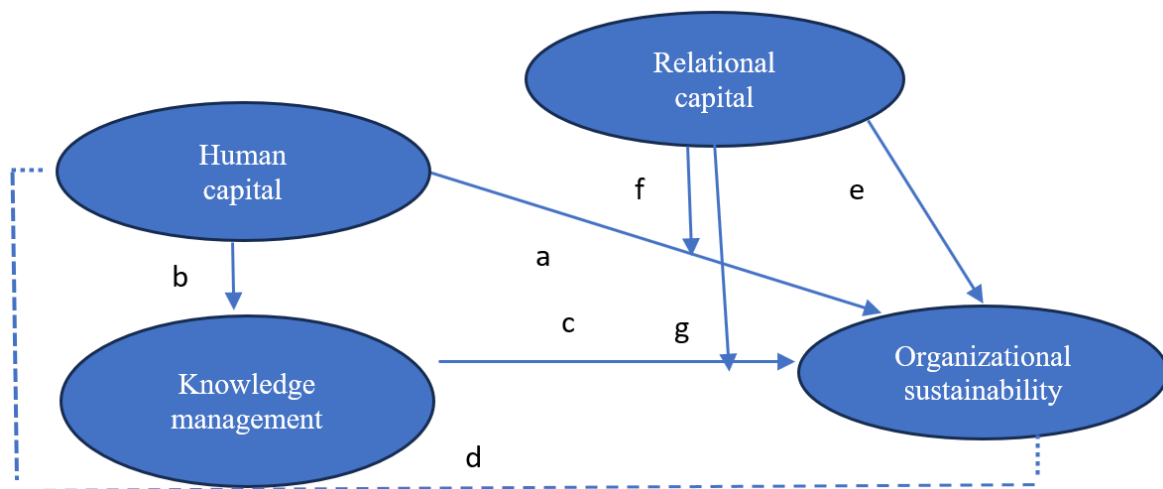
Figure 1. Conceptual framework.

Figure 1 explains that human capital directly affects organizational sustainability and indirectly through knowledge management. On the other hand, relational capital directly affects organizational sustainability while strengthening the relationship between human capital and knowledge management onorganizational sustainability . Figure 1 also illustrates the hypotheses that can be developed in this study.

a. Human capital has a direct effect on organizational sustainability.
b. Human capital has a direct effect on knowledge management.
c. Knowledge management has a direct effect on organizational sustainability.
d. Human capital has an indirect effect on organizational sustainability through knowledge management.
e. Relational capital has a direct effect on organizational sustainability .
f. Relational capital strengthens the relationship between human capital and organizational sustainability .
g. Relational capital strengthens the relationship between knowledge management and organizational sustainability.

Primary data were collected through structured questionnaires distributed to the selected companies. The questionnaire was developed based on validated indicators from previous studies and refined through expert consultations to ensure clarity and relevance. Respondents were key organizational representatives with sufficient knowledge of their companies' sustainability strategies such as senior managers or sustainability officers. This ensures that the data collected accurately reflect organizational practices and perceptions.

Hypothesis testing was conducted using path analysis with Partial Least Squares Structural Equation Modeling (SmartPLS). SmartPLS was chosen for its suitability in analyzing complex relationships among latent variables, especially when dealing with small to medium-sized datasets. SmartPLS does not require strict assumptions about data normality, making it ideal for this study compared to covariance-based SEM. Additionally, its ability to handle reflective and formative measurement models aligns with the study's conceptual framework which includes latent variables such as human capital, knowledge management, and relational capital. SmartPLS enables the examination of both mediating and moderating effects, which are key to testing the study's hypotheses.

The choice of methodologies was guided by the study's objectives and the nature of the research questions. The Slovin formula ensures that the sample size is robust and representative, while the use of questionnaires allows for collecting granular data directly from industry practitioners. The application of SmartPLS enables the analysis of complex interrelationships between the variables while providing robust statistical validation of the proposed hypotheses. These methodological choices collectively ensure that the findings are reliable and actionable.

4. RESEARCH RESULTS

4.1. Description of Questionnaire Filling Results

As a research instrument, the feasibility of the instrument was tested qualitatively through focus group discussion (FGD) activities by presenting Indonesian grammar experts to ensure that all questionnaire statement items are easy to understand and do not have double meanings, management experts to ensure the truth of the information to be explored based on the scientific field of study and business practitioners to ensure the suitability of statement items with real conditions.

The recapitulation of the results of filling out the questionnaire by 277 respondents in perceiving the variable statement items is presented in Tables 2 to 5.

Table 2. Description of human capital variables.

No.	Statement items	Total item scores	Average item scores
1	All employees have a certain level of education based on their expertise in the field of work.	1.102	3.98
2	Our company regularly enrolls employees in training and certifications that improve their work skills.	1.107	4.00
3	All employees perform their work following their skills.	1.137	4.10
4	The company supports employees by continuing to improve higher education levels.	1.113	4.02
5	External parties rate our employees (On average) as being creative.	1.135	4.10
6	The overall competence of employees is equal to the ideal level that we have set in the standards set by the company.	1.123	4.05
7	All employees consistently develop new ideas, and the company supports this.	1.128	4.07
8	The company always gives rewards as a form of appreciation to employees who perform better than they should.	1.121	4.05
9	The company places employees according to their work experience.	1.118	4.04
10	The company pays salaries to employees according to their experience and competence.	1.170	4.22
11	The company always considers ideas and innovations conveyed by employees in any department.	1.103	3.98
12	The company considers more experienced people in the recruitment process even though their education level is lower.	1.134	4.09
Average			4.06

Table 2 explains that the human capital variable is a strategic asset for companies with assessment indicators that average a score of 4.06 points. The score means that the company leadership carefully manages this variable. Company leaders respond to everything related to the company's efforts to improve employee performance to support the sustainability of profit, the planet, and the environment well, such as education levels, salaries, competence, creativity, etc. In this case, the company's policy to provide employee salaries based on experience and competence is the highest indicator in determining the quality of human capital with an average score of 4.22 points.

Table 3 explains that the knowledge management variable is a strategic asset for the company with a score of 4.01 points. The score means that knowledge-based asset management is an important leadership activity in determining the sustainability of profit, the planet, and the environment. These activities, such as directing employees to perform well according to their job descriptions, giving positive appreciation to outstanding employees, establishing and running corporate governance based on a clear organizational structure, being responsible for the feasibility and affordability of product prices for consumers, and so on, were responded to well by respondents. In this case, the leadership's ability to manage an employee's personal knowledge into company-owned knowledge determines the highest quality of knowledge management with an average score of 4.08 points.

Table 3. Description of knowledge management variables.

No.	Statement items	Total item scores	Average item scores
1	Leaders can direct employees so that they can carry out their duties and functions properly.	1.096	3.96
2	Managing an employee's knowledge is the best means to maximize company performance.	1.131	4.08
3	Outstanding employees get positive appreciation to produce the next performance better.	1.119	4.04
4	The company utilizes knowledge-based resources to build competitive advantage.	1.103	3.98
5	The company clearly defines each division leader's authority and responsibility limits.	1.121	4.05
6	The company has grouped employees into organizational units based on their expertise.	1.114	4.02
7	The company utilizes an employee's private knowledge as a source of sustainable competitiveness.	1.119	4.04
8	The company has a job description that shows the structure and reporting relationships.	1.108	4.00
9	The company always tries to develop quality products at competitive prices.	1.118	4.04
10	Companies always try to display the uniqueness they have from the products they market.	1.113	4.02
11	Every product marketed has passed the feasibility and safety test following government regulations.	1.087	3.92
12	Products that are marketed are sold at affordable prices and are easily available to customers.	1.094	3.95
Average			4.01

Table 4. Description of relational capital variables.

No.	Statement items	Total item scores	Average item scores
1	Employees can cooperate on team tasks.	1.111	4.01
2	The company can create satisfaction for all stakeholders.	1.153	4.16
3	The company's organizational structure makes employees not feel distant from each other.	1.124	4.06
4	Employees are eager to voice their opinions in group discussions.	1.120	4.04
5	The company cooperates with the government and other institutions in carrying out its operational activities.	1.108	4.00
6	The company has never stumbled upon a legal case that could reduce stakeholder trust.	1.095	3.95
7	The company has a good relationship with the labor union.	1.118	4.04
8	The company has good relationships with business partners such as creditors, suppliers etc.	1.103	3.98
9	Polls with customers show that they are generally satisfied with our company.	1.126	4.06
10	The company takes a short time to solve customer problems.	1.127	4.07
11	The company gets as much feedback as possible from customers in every situation.	1.085	3.92
12	The company fulfils customers' wants and needs by continuously striving to keep them satisfied.	1.100	3.97
Average			4.02

Table 4 explains that the relational capital variable is a strategic asset by company leaders with a score of 4.02 points. The implied definition of the score is the agreement of company leaders about the importance of relational capital in building the sustainability of profit, the planet, and the environment. All company activities related to strategies to create customer satisfaction, good relations with the surrounding community, and professional organizations are important activities in building relational capital. Of all the indicators analyzed, it is evident that

stakeholder satisfaction is the biggest indicator in determining the quality of relational capital with an average score of 4.16 points.

Table 5. Description of organizational sustainability variables.

No.	Statement items	Total item scores	Average item scores
1	The company sells products or services at affordable prices according to their quality.	1.111	4.01
2	The company has a competitive advantage that can provide maximum added value.	1.142	4.12
3	The company has profits that always increase yearly.	1.131	4.08
4	Profits earned by the company are used as much as possible to increase working capital.	1.108	4.00
5	The company has a standard operational procedure (SOP) to help employees carry out their duties and functions.	1.154	4.17
6	The company enrolls employees in professional training to improve their competencies.	1.102	3.98
7	All employees have the same opportunity to excel according to their competence.	1.101	3.97
8	The company provides the basic rights of each employee (Salary/ Honor/ Venture allowance, etc.) following their duties and functions fairly.	1.107	4.00
9	The company selects raw materials and other production/service components from environmentally friendly materials.	1.124	4.06
10	The company uses electricity, water, and other energy needs efficiently.	1.134	4.09
11	The company designs office/ workplace buildings with sufficient lighting without turning on lights during the day.	1.098	3.96
12	The company always refers to the applicable laws and regulations in terms of industrial waste disposal.	1.149	4.15
Average			4.05

Table 5 explains that building organizational sustainability based on the triple bottom line is a leadership strategy in building company sustainability with an average score of 4.05 points. This value also strengthens the theory that building sustainability by balancing the three concepts of capital, namely profit capital, planetary capital, and environmental capital is a very appropriate concept for companies in any industry. The company must get certain profits guaranteed to be obtained in the long term and manage human resources well while maintaining environmental quality. The company must have a standard operating procedure (SOP) for all activities so that employees can carry it out on an ongoing basis. This indicator is the main thing that must be carried out by the company with an average score of 4.17 points.

4.2. Outer Model

The measurement model analysis (outer model) tests the instrument's validity and reliability. Construct/variable validity indicates how well the scores acquired to define a variable which is tested using convergent and discriminant validity. The test model in question includes four variables: Human capital(HC) (X1/ independent), knowledge management(KM) (Y1/ mediation), relational capital(RC) (X2/ moderation), and organizational sustainability OS (Y2/ dependent variable). The structural model graphic (see Figure 2) illustrates the relationship between the four variables as follows:
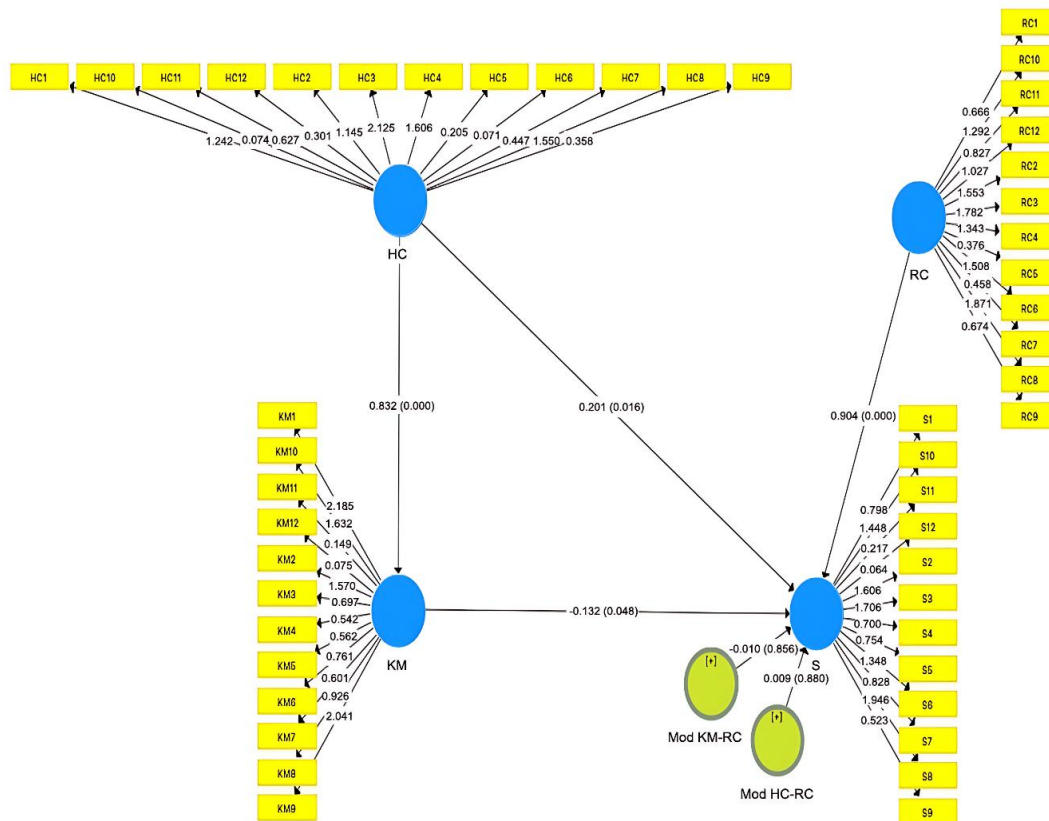
Figure 2. Structural model.

Figure 2 explains that data analysis is carried out by the conceptual framework (see Figure 1) where human capital as an independent variable is a variable that is predicted to affect organizational sustainability. The effect is measured directly or indirectly through knowledge management.

Table 6 shows the findings of the measurement model analysis based on the convergent validity value.

Table 6. Convergent validity testing results.

Indicator statement item	Loading factor	Indicator statement item	Loading factor
HC: Statement item 1	0.629	RC: Statement item 1	0.715
HC: Statement item 2	0.598	RC: Statement item 2	0.662
HC: Statement item 3	0.579	RC: Statement item 3	0.651
HC: Statement item 4	0.611	RC: Statement item 4	0.589
HC: Statement item 5	0.625	RC: Statement item 5	0.624
HC: Statement item 6	0.700	RC: Statement item 6	0.714
HC: Statement item 7	0.651	RC: Statement item 7	0.704
HC: Statement item 8	0.577	RC: Statement item 8	0.656
HC: Statement item 9	0.667	RC: Statement item 9	0.599
HC: Statement item 10	0.701	RC: Statement item 10	0.716
HC: Statement item 11	0.595	RC: Statement item 11	0.665
HC: Statement item 12	0.588	RC: Statement item 12	0.598
KM: Statement item 1	0.813	OS: Statement item 1	0.667
KM: Statement item 2	0.724	OS: Statement item 2	0.812
KM: Statement item 3	0.688	OS: Statement item 3	0.735
KM: Statement item 4	0.806	OS: Statement item 4	0.644
KM: Statement item 5	0.669	OS: Statement item 5	0.562
KM: Statement item 6	0.578	OS: Statement item 6	0.577
KM: Statement item 7	0.611	OS: Statement item 7	0.725
KM: Statement item 8	0.745	OS: Statement item 8	0.633
KM: Statement item 9	0.719	OS: Statement item 9	0.677
KM: Statement item 10	0.814	OS: Statement item 10	0.588
KM: Statement item 11	0.723	OS: Statement item 11	0.618
KM: Statement item 12	0.654	OS: Statement item 12	0.762

Source: Smart-PLS test results.

Table 6 shows that all statements for each indicator in each latent variable have a loading factor value greater than 0.5 implying that all statement items are legitimate. The findings of discriminant validity tests are shown in Table 7.

Table 7. Discriminant validity testing results.

Indicator statement item	HC	KM	RC	OS	MOD RC-HC	MOD RC-KM
HC: Item 1	0.663	0.560	0.498	0.554	–0.070	–0.134
HC: Item 2	0.702	0.642	0.647	0.690	–0.123	–0.230
HC: Item 3	0.766	0.674	0.453	0.682	0.042	–0.167
HC: Item 4	0.709	0.652	0.566	0.687	0.012	–0.028
HC: Item 5	0.697	0.654	0.660	0.684	–0.347	–0.253
HC: Item 6	0.712	0.648	0.578	0.624	–0.196	–0.241
HC: Item 7	0.689	0.582	0.499	0.572	–0.163	–0.140
HC: Item 8	0.671	0.480	0.593	0.605	–0.123	–0.398
HC: Item 9	0.647	0.404	0.516	0.532	–0.124	–0.275
HC: Item 10	0.675	0.476	0.456	0.523	–0.212	–0.176
HC: Item 11	0.776	0.621	0.577	0.488	–0.140	–0.233
HC: Item 12	0.670	0.579	0.582	0.610	–0.287	–0.187
KM: Item 1	0.582	0.810	0.682	0.710	–0.287	–0.187
KM: Item 2	0.603	0.868	0.735	0.679	–0.296	–0.179
KM: Item 3	0.674	0.788	0.754	0.684	–0.171	–0.115
KM: Item 4	0.706	0.789	0.548	0.686	–0.215	–0.197
KM: Item 5	0.593	0.697	0.482	0.551	–0.246	–0.089
KM: Item 6	0.671	0.696	0.443	0.494	–0.300	–0.409
KM: Item 7	0.543	0.791	0.684	0.643	–0.075	0.093
KM: Item 8	0.588	0.767	0.686	0.702	–0.245	–0.344
KM: Item 9	0.614	0.788	0.691	0.650	–0.205	–0.115
KM: Item 10	0.692	0.862	0.742	0.706	–0.330	–0.197
KM: Item 11	0.527	0.791	0.612	0.712	–0.155	–0.189
KM: Item 12	0.663	0.791	0.653	0.691	–0.481	–0.257
RC: Item 1	0.473	0.652	0.726	0.687	–0.171	–0.175
RC: Item 2	0.592	0.760	0.811	0.742	–0.295	–0.154
RC: Item 3	0.572	0.529	0.693	0.628	–0.246	–0.293
RC: Item 4	0.614	0.611	0.682	0.600	–0.216	–0.215
RC: Item 5	0.671	0.654	0.707	0.601	–0.273	–0.307
RC: Item 6	0.529	0.477	0.761	0.678	–0.245	–0.349
RC: Item 7	0.530	0.582	0.643	0.593	0.014	0.085
RC: Item 8	0.636	0.643	0.706	0.632	–0.172	–0.289
RC: Item 9	0.597	0.616	0.688	0.623	–0.259	–0.180
RC: Item 10	0.650	0.741	0.823	0.798	–0.340	–0.245
RC: Item 11	0.572	0.625	0.790	0.692	–0.191	–0.133
RC: Item 12	0.689	0.777	0.819	0.741	–0.507	–0.479
OS: Item 1	0.465	0.638	0.581	0.683	–0.040	–0.040
OS: Item 2	0.649	0.710	0.672	0.816	–0.247	0.214
OS: Item 3	0.487	0.610	0.621	0.697	–0.025	0.101
OS: Item 4	0.493	0.756	0.672	0.808	–0.208	–0.319
OS: Item 5	0.577	0.679	0.684	0.739	0.028	0.110
OS: Item 6	0.581	0.657	0.687	0.715	–0.216	–0.112
OS: Item 7	0.476	0.626	0.751	0.813	–0.297	–0.118
OS: Item 8	0.619	0.576	0.489	0.677	–0.188	–0.355
OS: Item 9	0.634	0.596	0.693	0.780	–0.205	–0.115
OS: Item 10	0.638	0.710	0.673	0.797	–0.334	–0.193
OS: Item 11	0.599	0.625	0.684	0.791	–0.104	–0.030
OS: Item 12	0.684	0.671	0.703	0.781	–0.481	–0.357
RC*HC	–0.216	–0.331	–0.330	–0.265	1.000	0.800
RC*KM	–0.265	–0.250	–0.291	–0.168	0.700	1.000

Source: Smart-PLS test results.

Table 7 demonstrates that all correlation values between indicators and their latent variables are stronger than those between indicators and other latent variables. This score indicates that all indicators meet the criteria for measuring variables allowing the instrument test to proceed with the reliability test. A variable is said to exceed model feasibility requirements if its composite realibility value is greater than 0.7. The reliability test results can be seen in Table 8.

Table 8. Reliability testing results.

Variables	Composite realibility
Human capital (HC)	0.794
Knowledge management (KM)	0.816
Relational capital (RC)	0.837
Organizational sustainability (OS)	0.797
Moderation RC*HC	1.000
Moderation RC*KM	1.000

Source: Smart-PLS test results.

Table 8 demonstrates that each variable has a composite reliability greater than 0.7 indicating that all variables can be used as data sources.

4.3. Hypothesis Testing (Inner Model)

This study uses the Smart-PLS model statistical test with the analysis results to answer the hypothesis that has been developed as shown in Table 6.

Table 9. Significance value of structural model.

Indicator statement item	Original sample (O) / Path coefficient	T statistics (|O/ STDEV|)	P values	Description
HC -> OS	0.201	2.418	0.016**	Significant
HC -> KM	0.832	17.005	0.000***	Significant
KM -> OS	0.132	1.983	0.048**	Significant
HC -> KM->OS	0.110	1.974	0.049**	Significant
RC -> OS	0.904	19.070	0.000***	Significant
Mod_RC*HC -> OS	0.009	0.151	0.880	Not significant
Mod_RC*KM -> OS	0.010	0.182	0.856	Not significant

Note: HC (Human capital); OS (Organizational sustainability); KM (Knowledge management); RC (Relational capital).
** (Double asterisks) denote significance at the 5% level ($p \leq 0.05$).
*** (Triple asterisks) denote significance at the 1% level ($p \leq 0.01$).

Table 9 explains the significance value of the relationship between variables as a basis for concluding the acceptance or rejection of the research hypothesis, namely.

a. The direct effect of HC on OS has a variable coefficient of 0.201 which is significant at a value of 0.016 (less than 0.05). This value means that the first hypothesis which states that human capital direct affects organizational sustainability is accepted.

b. The direct effect of HC on KM has a variable coefficient of 0.832, which is significant at a value of 0.000 (less than 0.05). This value means that the second hypothesis, which states that directly affects knowledge management is accepted.

c. The direct effect of KM on OS has a variable coefficient of 0.132, which is significant at a value of 0.048 (equal to 0.05). This value means that the third hypothesis, which states that knowledge management directly affects organizational sustainability is accepted.

d. The indirect effect of HC on OS through KM has a variable coefficient of 0.110, which is significant at a value of 0.049 (equal to 0.05). This value means that the fourth hypothesis, which states that human capital indirectly affects organizational sustainability through knowledge management is accepted.

e. The direct effect of RC on OS has a variable coefficient of 0.904, which is significant at a value of 0.000 (less than 0.05). This value means that the sixth hypothesis which states that relational capital directly affects organizational sustainability is accepted.

f. RC moderation on the effect of HC on OS has a variable coefficient of 0.009, which is significant at a value of 0.880 (more than 0.05). This value means that the seventh hypothesis, which states that relational capital strengthens the relationship between human capital and organizational sustainability is rejected.

g. RC moderation on the effect of KM on OS has a variable coefficient of 0.010, which is significant at a value of 0.856 (more than 0.05). This value means that the eighth hypothesis, which states that relational capital strengthens the relationship between knowledge management and organizational sustainability is rejected.

5. DISCUSSION

Overall, this study proves that knowledge-based strategic asset management in the form of human capital, knowledge management, and relational capital has a significant effect on organizational sustainability as measured by the company's ability to balance the three pillars of capital, namely human/social capital, economic/profit capital, and natural/environmental capital. An analytical approach to resource- based theory (Penrose, 1959) emphasizes the importance of strategic asset management as a determinant of long-term business success. Many researchers follow this opinion in strategic management on managing resources because organizational resources are heterogeneous, not homogeneous (Istikhoroh, Moeljadi, Sudarma, & Aisjah, 2021; Knudsen & Lien, 2023). Productive services derived from resources will give each organization a unique and irreplaceable character (Barney, 1991; Istikhoroh, Priyono, Ardhiani, Sulistiyawan, & Kurniawan, 2022). The research results emphasize that the TBL approach has become an important factor in assessing organizational performance and reputation within the company (Correia, 2018).

In accordance with the flow of thought offered in the research conceptual framework, the discussion of research outcomes is described as follows for each path of functional correlations between variables.

5.1. Human Capital has a Direct Impact on Organizational Sustainability

This study demonstrates that HC influences OS in publicly traded Indonesian enterprises. The structural model's positive coefficient value suggests that the relationship is unidirectional implying that the better the HC, the higher the OS level. As one type of knowledge-based strategic asset, human capital is proven to be able to move the company in a positive direction toward its sustainability (Istikhoroh, Ardhiani, Sulistiawan, Sukandani, & Utamayasa, 2023; Knudsen & Lien, 2023; Kryscynski & Morris, 2020). All efforts to improve employee welfare, from providing adequate salaries following their experience and competencies are weapons for company leaders to encourage employees to perform better (You et al., 2021). Employees can get a better income through performance rewards with the opportunity to perform better (Neumannova, Bernroider, & Obwegeser, 2023; You et al., 2021). Therefore, companies need to carry out organizational activities to increase employee competence (Istikhoroh et al., 2022). For example, by including employees in structured training or exchanging them with other companies within the same parent company.

Human resource competencies are indispensable for companies in building business sustainability (Jose & Chacko, 2017). At the level of strategic management science, employee competence is a determinant of the level of sustainable competitiveness (Barney, 1991). Still, it can also determine the company's destruction if the leadership cannot manage it based on knowledge management (Wiig, 1997). Company leaders can manage employee knowledge personally and incorporate it into organizational knowledge by disseminating the knowledge to all units to be implemented jointly by the organization (Andreou & Bontis, 2007; Cheong & Tsui, 2011). With such a policy, employee-owned knowledge can be implemented continuously and has the potential to continue to be developed as a determinant of competitiveness (Cheong & Tsui, 2011; Kim et al., 2011; Maury, 2018).

5.2. Human Capital has a Direct Impact on Knowledge Management

This study demonstrates how HC influences KM in publicly traded Indonesian companies. The structural model's positive coefficient value implies a unidirectional relationship which means that the better the HC, the better the KM. The findings of this study suggest that the quality of HC owned by the company influences the quality of HC management itself, known as KM. The quality of HC influences leaders' ability to guide staff to do activities in line with their primary job obligations, create reports in accordance with government requirements and customer preferences, read opportunities by employing corporate resources, and so on. In other words, enough HC can be used as a competitive resource to assess sustainability.

The study's findings are consistent with empirical research that shows that knowledge management is linked to a leader's ability to capture the collective advantage of organizational members and distribute it to any component of the company to achieve the best results. According to Al-Musali and Ismail (2014) only knowledge should be considered a strategic source while carrying out organizational operations because it can be handled in such a way that it adds value. Knowledge can characterize a firm in such a way that it is difficult to reproduce, hence increasing the organization's competitiveness. If the funds raised are for a building or other tangible assets, competitors will find it very easy to replicate. Thus, a logical relationship between HC and KM can be described, with higher quality HC resulting in higher quality KM because quality HC is easier to manage.

5.3. Knowledge Management has a Direct Impact on Organizational Sustainability

This study demonstrates how KM influences OS in publicly traded Indonesian enterprises. The structural model's positive coefficient value implies that the relationship between the two is unidirectional, i.e., the better KM, the better OS. This finding suggests that leadership efforts in knowledge management can improve competitiveness in the industrial environment. Proper knowledge management can result in a competitive advantage that is distinct, difficult to replicate, irreplaceable, and has an indefinite economic life. KM allows employees to continue to innovate, ensuring that they are not left behind by competition. Various leadership activities in KM include 1) managing employee knowledge as a strategic asset for the corporation, 2) ensuring effective corporate governance, and 3) aligning company and customer interests. The study's findings are consistent with the empirical evidence presented by Cheong and Tsui (2011) who state that organizational sustainability is determined not only by the organization's strategic resources but also by effective and innovative resource management in their utilization. The study's findings highlight the critical importance of knowledge management (KM) in understanding leaders' abilities to mix diverse experiences, intuitions, ideas, talents and motivations to achieve organizational goals through the use of information technology (Barclay & Murray, 1997).

5.4. Human Capital has an Indirect Impact on Organizational Sustainability through Knowledge Management

This study demonstrates that KM can moderate the effect of HM on OS in publicly traded Indonesian enterprises. The positive structural model coefficient value suggests that the relationship between the three variables is one-way implying that the better the HC, the easier it is to manage the KM, and the better the OS. This conclusion might be read as indicating that the activities of KM leaders in achieving organizational sustainability are highly dependent on the quality of HC possessed by the enterprise. HC quality influences a variety of KM activities such as 1) motivating employees to perform better by positively recognizing other employees who perform well, 2) monitoring employee performance in accordance with their limits and responsibilities, 3) belief in proper corporate governance, and 4) willingness to continue to innovate in products and services. Continuous KM performance has the potential to deliver long-term advantages and promote sustainability, whereas good/bad KM performance requires HC quality assistance. The findings support Dumay's (2009) conclusion that HC is difficult to implement in practice. To use HC as a company's strategic asset, leaders must be able to manage employees' unique knowledge as a company-owned asset and distribute it to all members of the organization (Cheong & Tsui, 2011;

Wiig, 1997) implement information technology in every policy, and maintain healthy organizational governance in accordance with applicable regulations (Blackman & Kennedy, 2009; Quyên, 2014).

5.5. Relational Capital has a Direct Impact on Organizational Sustainability

This study demonstrates how RC influences OS in publicly traded Indonesian enterprises. The structural model's positive coefficient value implies a unidirectional relationship which means that the better the RC, the better the OS. This finding suggests that companies' collaboration with other agencies and the government has a favorable impact on boosting corporate performance over time, even when formal cooperation has ended. Some firm operations are classified as relational capital, including 1) the ability to give service satisfaction to stakeholders, 2) the willingness to accept criticism and other feedback on the services provided, and 3) the establishment of excellent connections with customers, suppliers, creditors, and debtors. Business sustainability is related to the company's short-term and long-term performance and the community's perception of the company's existence (Gray, 2010). The research results underline the importance of a people-centered approach in Human Resource Management (HRM) to foster resilience and sustainability in facing contemporary challenges (Cooke, Dickmann, & Parry, 2022). Companies need to establish good relations with the surrounding community and be obligated to preserve the environment (Yu & Huo, 2019). Good relations with the community make it easier for companies to carry out their business activities calmly and peacefully and concentrate on carrying out business activities as a whole (Kim et al., 2011). Companies can cooperate with the government and professional organizations and remain focused on product and service quality to create customer satisfaction (Ferro et al., 2019; Kim et al., 2011). Empirical studies prove that satisfaction is the main factor determining loyalty, so it has the potential to generate sustainable profits.

5.6. Relational Capital Does Not Increase the Impact of Human Capital on Organizational Sustainability

This study demonstrates that RC does not enhance the effect of HC on OS. This phenomenon occurs because HC has a direct effect on OS with a rather high t-statistic value of 2.418 which is significant at the 0.016 level. The two factors do not require any moderating variables to reinforce them because of their strong link. This conclusion suggests that when evaluating the quality of services provided by an organization, stakeholders may prioritize *who* delivers the service rather than *how* it is delivered. Similarly, when it comes to fostering employee cooperation, the quality of the human resources involved has a significant impact on the level of cooperation.

5.7. Relational Capital Does Not Enhance the Impact of Knowledge Management on Organizational Sustainability

In the moderating link between RC and KM in OS development, this study also demonstrates that RC does not increase KM's influence on OS. The understanding of this phenomenon is comparable to RC's ability to moderate HC on OS. The correlation between KM and OS is very strong with a statistical t value of 17.005 which is significant at the 0.000 level. Stakeholders have high expectations for the leadership's capacity to manage HC as a knowledge-based strategic asset. Well-managed HC will be able to preserve a balance of social, natural, and financial capital. This is the benchmark for measuring sustainability using the triple bottom line approach.

5.8. Clarifying the Connection between Results

The study emphasizes that each variable such as human capital, knowledge management, and relational capital interacts synergistically to drive sustainability. Human capital directly influences sustainability and also indirectly impacts it through the mediating role of *knowledge* management. Relational capital, while significant on its own, does not act as a strong moderator between these variables. The results suggest that organizations must prioritize the effective integration of these assets to achieve long-term sustainability.

5.9. Meaning of All Results in Summary

The findings highlight that knowledge-based strategic assets, particularly human and relational capital managed through robust knowledge management practices, are critical for achieving the balance of social, environmental, and economic goals defined by the triple bottom line framework. These insights underscore the importance of strategic asset management for resilience and competitive advantage in emerging markets like Indonesia.

6. CONCLUSION

This conclusion highlights the crucial role of human resources and knowledge management in driving organizational sustainability while acknowledging the limitations of relational capital in this context. The research underscores the importance of integrating human capital and knowledge management strategies to enhance sustainability efforts. The study has significant implications for research and practice. Theoretically, it advances the integration of human capital, knowledge management, and relational capital within the triple bottom line (TBL) framework, emphasizing their interconnected role in achieving sustainability goals. It also encourages further exploration of these dynamics across diverse contexts. Practically, the findings offer actionable strategies for business leaders, including strengthening human capital through targeted training, fostering innovation through effective knowledge management and cultivating stakeholder relationships to enhance long-term organizational resilience. Organizations can drive sustainable growth and maintain a competitive advantage, particularly in emerging markets by aligning these efforts with the three pillars of the TBL framework—people, planet, and profit.

7. IMPLICATION

This research provides theoretical benefits for academics in developing strategic management science. Students' understanding of the strategic management science material provided by lecturers will be better if concrete examples from the business world accompany it. Course achievement indicators can be improved from initially only understanding scientific concepts and applying scientific disciplines to building students' perceptions of the need to have personal scientific competence and manage it with knowledge management. Practically, the research results can guide company leaders in determining the sustainability strategy for the organization they lead. Company leaders can determine knowledge-based strategic assets and manage them as a source of competitiveness in increasing people, profit, and planetary capital that determines sustainability.

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