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The Impact of Transformational Leadership, Transactional Leadership, and Knowledge Management on Innovation Mediated by Human Capital in The Pharmaceutical Industry in Indonesia

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Abstract

The objective of this research is to find out how transformational leadership, transactional leadership, and knowledge management impact innovation mediated by human capital in the Pharmaceutical Industry in Indonesia. Quantitative analysis was conducted using Partial Least Squares - Structural Equation Modeling (PLS-SEM) utilizing SmartPLS 4 software. An online questionnaire was carried out to obtain the data and the responses from 203 respondents resulted in 186 usable from 30 pharmaceutical industries across Indonesia. The findings point out that the direct effects of transformational leadership (TL), transactional leadership (TC), knowledge management (KN), and human capital (HC) relate positively and significantly to innovation (IN). The findings also confirmed that human capital mediates partially (complementary) the effect of transformational leadership on innovation, transactional leadership on innovation, and knowledge management on innovation. Based on this study to optimize innovation performance, it was suggested that pharmaceutical companies in Indonesia need to maintain the performance of any indicators that are already running well, and also need to put more effort into knowledge exchange among employees as well as the level of using new methods to improve efficiency and effectiveness of existing processes.

Keywords

transformational leadership, transactional leadership, knowledge management, human capital, innovation

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INTRODUCTION

During the COVID-19 pandemic, businesses in the health sector including the pharmaceutical industry became the favorites. The COVID-19 pandemic has affected the level of public awareness of health by 78.8% (Hardi et al., 2021). This is an opportunity for the pharmaceutical industry to grow faster by exploiting this opportunity. Apart from that, the government also strongly supports the growth of the pharmaceutical industry by including the pharmaceutical sector as a priority sector to realize the Making Indonesia 4.0 program. Furthermore, the government is also targeting that by 2024, 98% of Indonesian people will have membership in the Social Health Insurance Administration Body or BPJS (Minister of Health of the Republic of Indonesia, 2022).

Despite numerous opportunities, the pharmaceutical industry still faces challenges, notably dependence on imported raw materials. Roughly 90% of medicinal raw materials, or active pharmaceutical ingredients, are imported, constituting 30%-35% of the industry's total business value in Indonesia (Minister of Health of the Republic of Indonesia, 2022). The impact is the cost of drug production being relatively high and it will lead to high selling price of drugs. The increased selling price poses a challenge as it limits accessibility due to varying financial capacities. This affects target customer size and market share in the pharmaceutical industry. Consequently, the government encourages domestic production and reduced imports through TKDN (domestic component level) to alleviate drug prices (Minister of Health of the Republic of Indonesia, 2022).

The background of this research focuses on the ability of the Indonesian pharmaceutical industry to transform including the ability of the pharmaceutical industry to maximize opportunities and overcome these various challenges. This is inextricably linked to the company's capacity for innovation. Innovation participates as the lubricant through which organizations develop, adapt, and promote their products and services to meet customer needs. Companies that have innovation capabilities tend to be able to overcome external challenges that negatively affect their performance (Edeh et al., 2022).

Innovation greatly influences a company’s competitiveness, growth, and sustainability. The effects of innovation are expected to increase customer satisfaction, employee productivity, service quality, company share, and customer retention (Alrowwad et al., 2020). Several things become a stimulus for creating innovation in a company namely leadership, knowledge management, and human capital (Trott, 2021). Leadership is an important contributor to driving innovation (Trott, 2021) because leadership that focuses on innovation will use a certain style to empower and motivate the team (Alblooshi et al., 2020).

This study will explore transformational and transactional leadership. Transformational leadership emphasizes crucial values like justice, freedom, and equality. The relationship with the

leadership team is based on a purely personal value system such as providing justice (Demirtas & Karaca, 2020). Transactional leadership is more synonymous with exchanges between leaders and followers where the leader explicitly conveys his aspirations and the tasks that must be completed by his followers and promises rewards (Demirtas & Karaca, 2020; Costa et al., 2023).

Apart from leadership, another thing that stimulates innovation is knowledge management (Trott, 2021). The ability of all functions in a company to successfully implement knowledge management practices will determine the success of organizational innovation (Edeh et al., 2022; Romero-Hidalgo et al., 2021). Lastly, human capital is also a stimulus for innovation. A company's success in innovating certainly requires resources, one of which is human capital (Chen et al., 2021), (Gupta et al., 2020).

Several studies done in the past to explain the factors that stimulate innovation. In general, previous research is only limited to aspects of knowledge management or leadership aspects and the majority of studies still focus on the positive effects of transformational leadership, with transactional leadership occasionally having both good and negative effects. Apart from that, the previous researchers mentioned not to generalize the results of their research to all industrial sectors in all countries because the research they conducted was limited to a certain period and country. So, it may provide different results at other times countries and types of industries because they have different structures as well as cultures. Hence this research is intended to fill those gaps by enriching various factors that drive innovation including leadership, knowledge management, and human capital. Specifically, human capital will focus on employee engagement because previous research that included the human capital aspect generally only focuses on the level of experience, capability, expertise, and level of education.

Building on the preceding explanation, the objective of this study is to explore the influence of transformational and transactional leadership, along with knowledge management mediated by human capital, on innovation within the Pharmaceutical Industry in Indonesia.

LITERATURE REVIEW

Innovation

The process of generating new concepts and transforming them into valuable business ventures is referred to as innovation (Morris, 2007). Innovation is a management process that is strongly influenced by the organizational context and macro system in which the organization is located (Trott, 2021). Innovation can also be interpreted as managing all activities to produce various ideas, developing technology, creating and marketing new products promoting novel products (or enhancing existing ones), or refining the production process towards greater efficiency. Innovation has transformative qualities because innovation will replace existing products or services, including replacing the way currently used to do something and when the

time comes it will be replaced by the next innovation. Therefore, innovation will always be involved in an endless cycle (DeGraff & Quinn, 2006).

Several dimensions of innovation are well known as the 4Ps and two of them that will be discussed in this research are product innovation which focuses on changes to the products or services offered by the company and process innovation which is about how the product or service changes offered will be created and delivered (Bessant & Tidd, 2015).

Transformational Leadership

Leadership is a process, not a position (Hughes et al., 2019). Transformational leadership was discovered by J.M. Burns in the 1970s and B.M. Bass in the 1980s (Kolzow, 2014). This notion posits that transformational leadership emanates from the belief that individuals willingly follow a leader who can inspire and motivate them by crafting a compelling vision, advocating for that vision, and prioritizing the cultivation of relationships with followers, adopting roles akin to a teacher, mentor, and coach. Emphasizes not only the transformation of organizations but also the transformation of their followers (Bass & Steidlmeier, 1999).

The main goal of transformational leadership is to transform the company's goals, vision and goals of its followers into a cohesive team (Kolzow, 2014). Transformational leaders aspire to attain four primary dimensions, including idealized influence, then individualized consideration, as well as intellectual stimulation, and lastly inspiration*al motivation. (Bass & Steidlmeier, 1999).

The Impact of Transformational Leadership on Innovation

Past studies have confirmed that transformational leadership exerts a beneficial and substantial impact on innovation (Supriadi, 2020), (Alrowwad et al., 2020), (Afsar & Umrani, 2020) and (Cui, 2022). The influence of transformational leadership is stronger on process innovation than product innovation (Rasheed et al., 2021). More specifically, it was found that the dimensions of transformational leadership consisting of idealized influence, inspirational motivation and individualized consideration had a significant and positive effect on product innovation, but were different from the influence of intellectual stimulation which has a negative impact on innovation (Ahmad et al., 2019).

Hypothesis 1 (H1) : Transformational leadership has a significant effect on innovation.

Transactional Leadership

Transactional leadership refers to the exchange of relationships between leaders and followers to meet their respective interests (Bass, 1999). Transactional leadership dynamics

(Bass & Steidlmeier, 1999), include tasks by giving direction on what targets need to be achieved, followed by a reward system, after giving targets, the leader also communicates appreciation for the achievement of tasks that have been determined and agreed upon. After that, there are intentions, trust by keeping promises, which is related to the reward system, consequences by taking corrective action if their subordinates fail to achieve the targets that have been set and lastly, the legal process is an impartial conflict resolution process (Kolzow, 2014), (Demirtas & Karaca, 2020). Transactional leadership comprises three dimensions: contingent reward/reinforcement, active management by exception, and passive management by exception (Mesu, 2013), (Bass & Steidlmeier, 1999).

The Impact of Transactional Leadership on Innovation

In innovation-oriented organizations, transactional leaders motivate subordinates to innovate by providing rewards; thus, the company's innovation performance increases (Avolio & Bass, 2002). Previous research found that transactional leadership has a significant and positive relationship with innovation (Alrowwad et al., 2020), (Supriadi, 2020), (Rr, 2020). Leadership styles influence innovation and performance differently, therefore it is important for transactional leadership to determine targets and rewards (Barnová et al., 2022), (Eckardt et al., 2020). Transactional leadership has a positive impact on innovation because relationships among transactional leaders and subordinates are often based on transactions. When team members carry out tasks and achieve goals as set by the leader, they can receive certain rewards as agreed at the beginning (Cui, 2022). Meanwhile, other research findings are different, finding that transactional leadership has negative effect on innovation (Costa et al., 2023).

Hypothesis 2 (H2): Transactional leadership has a significant effect on innovation.

Knowledge Management

Knowledge management aims to create value and meet tactical and strategic requirements by methodically managing an organization's knowledge assets. Knowledge management encompasses the various initiatives, processes, strategies, and systems that support and improve the creation, sharing, assessment, storage, and improvement of knowledge (Hajric, 2018).

The purpose of knowledge management is to add value through reuse and innovation by consciously and methodically coordinating an organization's people, technology, processes, and organizational structure. To promote ongoing organizational learning, this coordination is accomplished through producing, disseminating, and using knowledge as well as by ingraining best practices and important lessons learned (Dalkir, 2023). The main benefits of it are enabling

organizations to bring innovations to market quickly, increasing operational efficiency, increasing new product offerings, and better customer service with increased benefits and better value (Dalkir, 2023). Dimensions of knowledge management (Hajric, 2018), include knowledge sharing, knowledge reuse, knowledge creation, and knowledge acquisition.

The Impact of Knowledge Management on Innovation

Previous research has proven that there is a positive and significant relationship between knowledge management and innovation in companies, in other words, the higher the level of knowledge management, the higher the level of innovation (Jiménez et al., 2020). Knowledge management has a positive effect on stimulating innovation that improves organizational performance (Rezaei et al., 2021) both product and process innovation (Abbas et al., 2020) through the knowledge creation (Ode, 2020). Knowledge management with knowledge acquisition and knowledge implementation have a significant positive effect on innovation (Papa et al., 2020), (Shahzad et al., 2020).

Hypothesis 3 (H3): Transactional leadership has a significant effect on innovation.

The Mediating Role of Human Capital

Human capital theory examines how individuals within an organization contribute their knowledge, skills, and abilities to improve organizational competence, as well as the importance of those contributions. According to the theory of human capital, the company can invest in people and will receive valuable returns on their investments (M. Armstrong & Taylor, 2020).

One of the critical elements of human capital management is employee engagement, having employees who have a positive attitude towards their work and have the will to do their work well regardless of their industrial sector (Coppin, 2017). Employee engagement is a measure of how deeply employees are committed to their work, as well as how strong their job and the organization are (A Noe et al., 2016). People become engaged when they are driven to perform at a high level and are dedicated to their work and the organization (M. Armstrong & Taylor, 2020). Human capital is crucial to drive innovation because it will shape the company's uniqueness and the process for acquiring skills, abilities, knowledge and expertise (Costa et al., 2023), (Sun et al., 2020), (Costa, 2023), (Taleb, 2023) both product innovation and process innovation (Fu et al., 2020) which then improves organizational performance (Rezaei et al., 2021) through its four dimensions (Abu-Rumman, 2021), (Alneyadi et al., 2019) and (Pasamar et al., 2019).

Transformational and transactional leadership play crucial roles in guiding human capital, inspiring them to overcome the diverse challenges encountered by the company (Fakhri

et al., 2020). Moreover, this will encourage increased quality of human capital through employee engagement (Khan et al., 2020). The connection between transformational leadership and innovation is partially mediated by human capital through employee work engagement. (Edelbroek, 2019), (Pasamar et al., 2019), and (Sianggaran & Aseanty, 2020). Transformational leadership will lead in a supportive and friendly manner so that their interpersonal relationships with subordinates will become stronger, which increases employees' ability to innovate (Qiang et al., 2023). The stronger the human capital, the stronger the influence of transformational leadership on innovation will be. This means that the influence of human capital positively mediates the relationship between transformational leadership and innovation. (Costa et al., 2023).

It was found in previous research that transactional leadership has a positive and significant influence on human capital through the employee engagement dimension. Transactional leadership involves values relevant to the exchange process, such as responsibility and reciprocity (Thanh & Quang, 2022). Transactional leadership through the dimensions of contingent rewards and management by exception has a positive and significant influence on human capital through employee engagement (Aboramadan & Dahleez, 2020). Transactional leadership mediated by human capital through employee engagement has a positive and significant influence on company innovation performance (Aboramadan & Dahleez, 2020).

However, in contrast, there was research that found that transactional leadership did not have a significant influence on human capital (Edelbroek, 2019). Human capital through the employee engagement dimension does not have a mediating influence on the relationship between transactional leadership and innovation (Edelbroek, 2019), (Pasamar et al., 2019).

Knowledge management has a positive and statistically significant impact on human capital. It allows employees to share the knowledge and experience they have collected from solving problems they have done (knowledge reuse) and is important to achieve company goals (Massaro et al., 2020). It has a positive and significant effect on human capital (Rezaei et al., 2021), (Helal et al., 2023) driven by the process dimensions of knowledge creation, knowledge sharing, and knowledge reuse (Mirzaie et al., 2019). Knowledge management is needed as an important resource for increasing human capital to increase innovation (Singh et al., 2019), (Safriyanti et al., 2021). Human capital mediates the influence of knowledge management on innovation (Rezaei et al., 2021), (Idris et al., 2019) both product innovation and process innovation (Helal et al., 2023). As a result, the following hypothesis is proposed:

Hypothesis 4 (H4) : Human capital has a significant effect on innovation.

Hypothesis 5 (H5) : Transformational leadership has a significant effect on human capital.

Hypothesis 6 (H6) : Human Capital has a mediating role in the influence of transformational leadership on innovation.

Hypothesis 7 (H7) : Transactional leadership has a significant effect on human capital.

Hypothesis 8 (H8) : Human Capital has a mediating role in the influence of transactional leadership on innovation.

Hypothesis 9 (H9) : Knowledge management has a significant effect on human capital.

Hypothesis10 (H10) : Human Capital has a mediating role in the influence of knowledge management on innovation.

RESEARCH METHODS

Thirty Indonesian companies in the pharmaceutical sector are the objects of this study. The employees of these companies are the subjects of this study.

The sampling technique used in this research is a non-probability sampling technique, namely a sampling technique that does not provide equal opportunities for each element or member of the population to be selected as a sample (Sudrajat, 2018). The type of non-probability sampling used is judgment sampling which uses sample selection techniques if the researcher determines the selected sample subjects based on the researcher's judgement alone.

A questionnaire was distributed to employees of the thirty companies listed above as the technique of data collection in this study. The questionnaire has instructions for filling it out and a rating scale with five Likert scales. The data was collected and used to do a descriptive and statistical analysis using structural equation modeling-partial least square (PLS-SEM) and utilizing SmartPLS 4 software.

RESULTS AND DISCUSSION

This study was carried out by administering online questionnaires to the designated participants. The total number of questionnaire responses received was 203 and those that could be processed were 186. The attributes of the surveyed participants were determined by considering factors such as gender, age, highest educational attainment, length of service, and the position held by the respondent. Gender distribution is balanced, with 50% female and 50% male respondents. In terms of age, the 30 to 40 years age group dominates at 40%, followed by the 40 to 50 years age group at 37%. Respondents aged 20-30 years constitute 12%, and those over 50 years account for the remaining 10%. Regarding education, the majority (65%) hold a bachelor's degree, 16% have a diploma, 12% possess postgraduate education, and the remaining 6% completed high school. Work experience classification shows that 60% have over 10 years of experience, 17% have worked 5 to 10 years, 11% have 2 to 5 years, and the remaining 12% have 1 to 2 years of experience. In terms of position, 44% are staff, 23% are managers, 16% are senior managers, 13% are supervisors, and 4% hold director positions.

The degree to which the exogen variable influences the endogen variable will be displayed in the route coefficient output results. If the p-value <0.05 at α 5% it means that the output results are significant. Table 1.1, and table 1.2 below display the path coefficient and p-value results:

Table 1. Direct effects

No.	Variable Exogen -Variable Endogen		Path coefficient (β)	*p-value*	Remarks
1.	TL	IN	0.222	0.001	Significant
2.	TL	HC	0.222	0.001	Significant
3.	TC	IN	0.191	0.007	Significant
4.	TC	HC	0.380	0.000	Significant
5.	KN	IN	0.324	0.000	Significant
6.	KN	HC	0.330	0.000	Significant
7.	HC	IN	0.239	0.002	Significant

Table 2. Indirect effects

No.	Variable Exogen – Mediator - Endogen	Path coefficient (β)	*p-value*	Remarks
1.	TL->HC->IN	0.053	0.025	Significant
2.	TC->HC->IN	0.091	0.011	Significant
3.	KN->HC->IN	0.079	0.006	Significant

Analysis of the direct effect of transformational leadership on innovation

Table 1.1 indicates that the path coefficient for transformational leadership influencing innovation is β = 0.222 and p-value 0.001<0.05 supporting the acceptance of the first hypothesis (H1). This affirms that transformational leadership, characterized by idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration, has a direct and positive significant impact on innovation within the pharmaceutical industry in Indonesia, in line with the theory discussed by (Bass & Steidlmeier, 1999). This study diverges from previous research (Ahmad et al., 2019), particularly in the case of the individualized consideration dimension, which exhibits a negative impact on innovation. However, the dimensions of idealized influence, inspirational motivation, and intellectual stimulation continue to demonstrate a significant and positive influence on innovation.

Idealized influence is exemplified by leadership that upholds integrity. Inspirational motivation is conveyed through the leader inspiring the team to dedicate themselves to achieving the organization's vision. Intellectual stimulation is demonstrated by encouraging creative thinking and alternative perspectives, leading to more effective work processes and increased innovation. Individualized consideration is shown through leadership that listens to input, fostering a culture of open communication and encouraging innovation. This finding follows the theory presented by (Kolzow, 2014).

Analysis of the direct effect of transactional leadership on innovation

Table 1.1 show that the path coefficient value of transactional leadership on innovation is β = 0.191 and p-value 0.007 <0.05 leading to the acceptance of the second hypothesis (H2). This proves that transactional leadership has a positive and significant effect on innovation. The results of this research are consistent with the theory presented by (Avolio & Bass, 2002) that the transactional leadership dimensions of contingent rewards/reinforcement and active management by exception will encourage innovation in the company. The results of this research are also consistent with several previous studies such as research conducted by (Supriadi, 2020), (Alrowwad et al., 2020), (Cui, 2022) which stated that transactional leadership has a positive and significant effect on innovation. However, this is not in line with the findings (Costa et al., 2023) which found that transactional leadership had a negative effect on innovation.

Research findings confirm that transactional leadership directly enhances innovation in the pharmaceutical industry in Indonesia. This is accomplished through the implementation of contingent rewards and active management by exception. Clear articulation of performance targets, along with rewarding goal achievement (contingent rewards), leads to increased innovation performance and significant productivity gains. Additionally, active leadership involvement and monitoring of team performance (active management by exception) contribute to problem-solving and process improvements, further elevating innovation performance. This is supported by previous research conducted by (Rr, 2020) which also found that transactional leadership directly has a significant effect on innovation performance.

Analysis of the direct effect of knowledge management on innovation

Table 1.1 show that the path coefficient value of knowledge management on innovation is β = 0.324 and p-value 0.000 <0.05 supporting the acceptance of the third hypothesis (H3). This proves that knowledge management has a positive and significant effect on innovation. The results of this study are consistent with previous research such as research conducted by (Jiménez et al., 2020), (Becerra-Fernandez et al., 2024), (Abbas et al., 2020), (Shahzad et al., 2020), (Rezaei et al., 2021) and (Ode, 2020) which state that there is a positive and significant relationship between knowledge management and innovation.

The findings in this research are also consistent with the theory presented by (Dalkir, 2023). Effective knowledge management enhances innovation in Indonesia's pharmaceutical industry. Elevating the company's operations leads to cost reduction, innovative processes, products, and services, fostering growth and heightened competitiveness. The commitment of Indonesia's pharmaceutical industry to implementing various dimensions of knowledge management underscores this realization such as the theory put forward by (Hajric, 2018),

including knowledge sharing among team members fosters new ideas, enhancing both work processes and the functionality of pharmaceutical products/services in Indonesia. Collaborative knowledge reuse between teams significantly boosts productivity, particularly in work processes, contributing to process innovation. Active employee participation in idea generation and the company's commitment to experimenting with new concepts (knowledge creation) enables pharmaceutical companies to introduce more innovative products/services, anticipating a positive market response. The consistent support for team members to acquire additional knowledge from external sources, as noted by Papa et al (Papa et al., 2020) and Shahzad et al. (Shahzad et al., 2020), positively influences innovation in the pharmaceutical industry in Indonesia.

Analysis of the direct effect of human capital on innovation

Table 1.1 shows that the path coefficient value of human capital on innovation is β = 0.239 and p-value 0.002 <0.05 so the fourth hypothesis (H4) is accepted. This proves that human capital has a positive and significant effect on innovation. The results of this study are consistent with previous research such as research conducted by (Sun et al., 2020), (Costa et al., 2023), (Rezaei et al., 2021), (Fu et al., 2020) and (Taleb, 2023) which states that there is a positive and significant relationship between human capital and innovation.

The results of this research are also consistent with the theory presented by (Coppin, 2017) which states that human capital through the employee engagement dimension will significantly influence innovation performance in companies. Employee engagement will occur when people who work in a company are committed to the company and also to their work to achieve the highest level of performance as described by (M. Armstrong & Taylor, 2020). This will be encouraged when employees feel that they are involved in the decision-making process, they are also allowed to provide input for improvements in the company, so that employees feel that they have an important contribution in providing a positive impact on the company's progress through the various innovations carried out.

Analysis of the direct effect of transformational leadership on human capital

Table 1.1 shows that the path coefficient value of transformational leadership on human capital is β = 0.222 and p-value 0.001 <0.05 so the fifth hypothesis (H5) is accepted. This proves that transformational leadership has a positive and significant effect on human capital. The results of this research are strengthened by several previous studies such as research conducted by (Abu-Rumman, 2021). Through the dimensions of idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration, transformational

leadership has a positive and significant influence on human capital, this is in line with previous research conducted by (Alneyadi et al., 2019), (Pasamar et al., 2019).

Transformational leaders in the pharmaceutical industry in Indonesia strengthen employee engagement through exemplary leadership, clearly conveying the vision that must be achieved together and providing space for team members to think creatively and see solutions to problems from various points of view. This leadership will undoubtedly enhance human capital quality as the bond between employees and their superiors strengthens over time. Employees, feeling fully engaged in decision-making and given space to contribute, perceive superiors as facilitators in generating alternative solutions to company challenges. This is in line with previous research conducted by (Eckardt et al., 2020), (Abdullahi et al., 2020), and (Fakhri et al., 2020).

Analysis of the role of human capital as a mediator variable in the effect of transformational leadership on innovation.

Table 1.2 shows that human capital positively and significantly mediates the indirect effect of transformational leadership on innovation with a path coefficient of 0.053, and a p-value 0.025 <0.05. Thus the sixth hypothesis (H6) is accepted, the role of human capital is partial complementary mediation. These findings further strengthen previous research conducted by (Edelbroek, 2019), (Pasamar et al., 2019) and (Costa et al., 2023) which stated that human capital with the employee engagement dimension partially mediates the relationship between transformational leadership and innovation. The results of this research show that the success of transformational leadership through the ability to convey inspiring values and vision causes employees to be inspired to give their best and improve the quality of human capital through increasing employee engagement, which has an impact on increasing innovation in the pharmaceutical industry in Indonesia. This finding is consistent with the theory presented by (M. S. T. Armstrong, 2014) and (A Noe et al., 2016), (Sun et al., 2020), (Qiang et al., 2023).

Analysis of the direct effect of transactional leadership on human capital

Table 1.1 shows that the path coefficient value of transactional leadership on human capital is β = 0.380 and p-value 0.000 <0.05 so the seventh hypothesis (H7) is accepted. This proves that transactional leadership has a positive and significant effect on human capital. The transactional leadership method of implementing reward exchanges based on the performance achievements of their subordinates and conversely providing punishments when employees do not achieve agreed performance targets has a positive and significant effect on human capital in the pharmaceutical industry in Indonesia. This is in line with the explanation (Bass & Steidlmeier, 1999), (Avolio & Bass, 2002).

Transactional leadership, which motivates subordinates through resource provision and rewards tied to effective performance, fosters favorable conditions. Employees feel appropriately rewarded for their efforts, promoting heightened engagement and enhancing human capital quality in the Indonesian pharmaceutical industry. This aligns with research by (Fakhri et al., 2020) and (Thanh & Quang, 2022) affirming the positive and significant impact of transactional leadership on human capital through employee engagement, incorporating values like responsibility and reciprocity. Contingent rewards and active management by exception, have a positive and significant influence on human capital through employee engagement in the pharmaceutical industry in Indonesia. This is consistent with the results of previous research conducted by (Aboramadan & Dahleez, 2020). However, this is different from the results of research conducted by (Edelbroek et al., 2019) which found that transactional leadership did not have a significant influence on human capital, especially on the employee engagement dimension.

Analysis of the role of human capital as a mediator variable in the effect of transactional leadership on innovation.

Table 1.2 shows that human capital positively and significantly mediates the indirect effect of transactional leadership on innovation with a path coefficient of 0.091, and a p-value 0.011 <0.05. Thus the eighth hypothesis (H8) is accepted, the role of human capital is partial complementary mediation. This finding is different from the findings in research conducted by (Edelbroek, 2019) and (Pasamar et al., 2019) which stated that human capital through the employee engagement dimension does not have a mediating influence on the relationship between transactional leadership and innovation.

However, the results of this research are consistent with the theory presented by (Bass, 1999) and (Avolio & Bass, 2002) which states that providing contingent rewards can increase employee motivation after the desired goals and respective incentives are clearly defined. The existence of a clear reward and incentive scheme for employee performance achievements will increase human capital through the employee engagement dimension which will encourage increased innovation performance in the pharmaceutical industry in Indonesia. This is consistent with the theory presented by (M. S. T. Armstrong, 2014) and also previous research such as that conducted by (Barnová et al., 2022), (Eckardt et al., 2020) and (Aboramadan & Dahleez, 2020).

Analysis of the direct effect of knowledge management on human capital

Table 1.1 shows that the path coefficient value of knowledge management on human capital is β = 0.330 and p-value 0.000 <0.05 so the ninth hypothesis (H9) is accepted. This proves that knowledge management has a positive and significant effect on human capital. Through the application of various dimensions of knowledge management such as knowledge sharing,

knowledge reuse, knowledge creation and knowledge acquisition, it is possible to improve the quality of human capital in the pharmaceutical industry in Indonesia. This is consistent with the findings of previous studies such as those conducted by (Mirzaie et al., 2019), (Massaro et al., 2020), (Assaker et al., 2020), (Rezaei et al., 2021) and (Helal et al., 2023).

An effective knowledge management process in the pharmaceutical industry in Indonesia has been proven to increase human capital so that companies can achieve their goals. This is done by maximizing knowledge utilization, knowledge identification, knowledge reflection, and knowledge sharing with employees, both experiences gained through environmental information and systematic skills gained from new experiences. This is consistent with previous research conducted by (Safriyanti et al., 2021) which found that the quality of human capital is supported by knowledge management so knowledge management is a strategic asset for the company.

Analysis of the role of human capital as a mediator variable in the effect of knowledge management on innovation.

Table 1.2 shows that human capital positively and significantly mediates the indirect effect of knowledge management on innovation with a path coefficient of 0.079, and a p-value 0.006 <0.05. Thus the tenth hypothesis (H10) is accepted, the role of human capital is partial complementary mediation. The results of this study are consistent with previous research such as research conducted by (Idris et al., 2019), (Singh et al., 2019), (Sun et al., 2020) and (Rezaei et al., 2021) which stated that partially, human capital mediates the indirect relationship between knowledge management and innovation positively and significantly in both product and process dimensions (Helal et al., 2023). The benefits of good knowledge management increase the quality of human capital which will encourage increased productivity, provide value-added goods and services, increase customer satisfaction, and stimulate creativity and innovation. This is consistent with what was found by (Rezaei et al., 2021), (Safriyanti et al., 2021). This research reveals that successful knowledge management enhances human capital quality by increasing employee engagement. This, in turn, motivates employees to contribute their knowledge, skills, and abilities to enhance organizational capabilities and improve innovation performance. This finding is in line with the theory explained by (M. Armstrong & Taylor, 2020) and (Coppin, 2017).

CONCLUSIONS

This research examined the relations between transformational leadership, transactional leadership, and knowledge management on innovation mediated by human capital. The study finds that in the context of pharmaceutical companies in Indonesia, transformational leadership, transactional leadership, knowledge management, and human capital are crucial elements by impact significantly the innovation. This research adds to the existing knowledge through its

highlights on the primary role of human capital in stimulating company innovation and in positively mediating the indirect effect of transformational leadership on innovation, the indirect effect of transactional leadership on innovation, as well as the indirect effect of knowledge management on innovation.

Moreover, in the context of Indonesia, the current study might be considered useful literature to earlier studies in the same field. Previous research in this area examined the relationship between transformational leadership and innovation, the effect of transactional leadership on innovation, the impact of knowledge management on innovation as well as the relationship between human capital and innovation. Contrariwise, this study presents a combined theoretical framework that explores the linkage between all variables. In particular, the present study examined the intermediate role of human capital, which enhances the linkage between transformational leadership, transactional leadership, and knowledge management on innovation.

The research findings are crucial for enhancing innovation performance in pharmaceutical companies. Knowledge management, particularly in fostering knowledge exchange among team members, demands attention. The pharmaceutical industry in Indonesia should consider implementing an open and collaborative culture, along with rewarding employees for active knowledge sharing. In terms of innovation, there is a need for improvement in the utilization of new methods to enhance existing processes. This can be achieved through small-scale trials to measure effectiveness and efficiency before full implementation. The continual implementation of the PDCA (Plan-Do-Check-Act) cycle is essential for ongoing process improvement, ultimately contributing to improved innovation performance.

Need to be noted that this study has limitations. This research only explores one sector in Indonesia, namely the pharmaceutical industry sector. Thus, it may not be wise to generalize the results to other sectors in Indonesia. Therefore, other sectors must also be explored individually, such as the construction, telecommunications, mining, and media sectors. Further research is recommended to refine this research by exploring additional exogenous variables that enable companies to increase innovation performance in the pharmaceutical industry in Indonesia.

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