

Determinants of The Role of Human Resource Development and Technological Innovation on Employee Performance in Public Companies

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Abstract

Employee performance is reflected in the role of HRD in conducting structured education and training activities – leveraging innovative technological facilities to enhance administrative speed and service efficiency – as well as in the broader role of human capital. This study aims to analyze the impact of HRD, human capital, and technological innovation on employee performance. The research sample consisted of 120 employees from Company XYZ, and the data were analyzed using SEM-PLS. The results indicate a significant positive relationship between HRD and employee performance; human capital also has a significant positive effect on employee performance, as does technological innovation. The R-squared value of 59 percent demonstrates that the independent variables contribute to the improvement of employee performance.

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1. Introduction

Strategies for developing human resources—or human capital—as a primary factor of production are often overlooked or deprioritized by many companies in favor of factors such as capital, technology, and financial assets. Many corporate leaders fail to recognize that a company's profits actually stem from its human capital, largely because corporate activities are viewed solely through a business lens. These leaders do not perceive their companies as entities defined by knowledge and skills.

Research focusing on individual human resources in relation to corporate performance has been pioneered since the early 1990s. Bartel (1994) examined the relationship between adopted training programs and productivity growth, while the link between training programs and financial performance was supported by Gerhart and Milkovich (1992). Weitzman and Kruse (1990) identified a relationship between incentive compensation schemes and productivity, and Terpstra and Rozell (1993) examined recruitment processes, selection validation tests, and the use of formal selection procedures, finding a link to

corporate financial performance. In general, selection practices within human resource management are positively associated with corporate performance (Becker and Huselid 1992; Schmidt, Hunter, McKenzie, and Muldrow 1979). Performance evaluation and its link to compensation schemes have been identified as contributors to increased corporate profitability (Borman 1991).

Empirical studies regarding the relationship between intellectual capital – specifically in the form of knowledge resources – and corporate performance include those conducted by Nonaka and Takeuchi (1995) and Zahra and George (2002). Nonaka and Takeuchi (1995) stated that only companies capable of continuously generating new knowledge are well-positioned to achieve a competitive advantage. Zahra and George (2002) proposed a reconceptualized model linking knowledge sources, absorptive capacity, and a firm's ability to generate competitive advantage.

Human resource research in the global era increasingly focuses on strategic human resource development. Nurjaman (2023) demonstrates that companies implementing strategic human resource management are able to create organizational flexibility, thereby becoming better prepared to face global competition. Strategic human resource development encompasses continuous training, talent management, and structured performance evaluation, all of which contribute to enhanced corporate performance (Gea, 2014).

According to research by Brandes (2022), continuous employee training not only enhances individual skills but also encourages organizations to become more dynamic and flexible. This is crucial in the digital era, where rapid technological changes demand a skilled workforce ready to adapt to ongoing digital transformation (Pelita Bangsa, 2023). The importance of human resource competency development is also driven by the need to retain top talent. Amidst high workforce mobility in the global market, organizations must be capable of developing effective human resource programs to maintain employee loyalty and ensure continued contributions to the company's success. A study by Gea (2023) emphasizes that a work culture supporting employee development is a key factor in retaining quality talent within an organization.

Pfeffer (1994) and Upton (1995) state that a company's success in facing global market competition is determined primarily by human capital rather than physical capital; therefore, companies are encouraged to invest in various training programs to enhance their employees' knowledge resources, expertise, and technological innovation capabilities to a level superior to that of their competitors. Technology enhances efficiency and supports innovation. The use of information technology enables organizations to operate more effectively and provides a competitive advantage (Brynjolfsson & McAfee, 2014).

Innovation has become a key factor in human resource (HR) competency development and organizational success, particularly amidst increasingly intense global competition. In a dynamic business environment, organizations are required not only to create new products and services but also to adopt innovative processes that enhance efficiency and effectiveness.

Employees empowered to innovate are more likely to engage in the creative process, thereby enhancing their contribution to the organization's success (Tidd & Bessant, 2013). Employee engagement is directly linked to productivity and satisfaction; actively engaged

employees are more likely to offer new ideas and contribute to the innovation process (Harter et al., 2002).

The key issues addressed in this study are as follows: (1) How human resource training and development affect employee performance; (2) How human capital affects employee performance; (3) How technological innovation affects employee performance.

1.1. Human Resource Development

Human resource development consists of a series of systematic and planned activities designed by an organization to enhance employees' knowledge, skills, and competencies in order to meet current and future job requirements. These activities encompass training, education, and career development, aiming to prepare employees for greater responsibilities within the organization (Hidayah et al., 2024; Marayasa et al., 2022). Broadly speaking, the goal of human resource development is to improve work effectiveness, productivity, and the quality of outcomes achieved. Through continuous development, organizations can align employee skills with technological advancements and increasingly dynamic job demands. Such development can also boost employee motivation, satisfaction, and commitment, ultimately having a positive impact on the organization's performance and competitiveness (Nur Syahiroh et al., 2024; Putra & Sobandi, 2019).

Human resources to create and maintain an advantage over customers (Notoatmojo 2003). Human resources can also be defined as anything that can be utilized to meet needs or resolve a problem. Human Resource Development consists of six elements (Hasibuan 2002), namely Manpower Planning, Employee Recruitment, Employee Development, Assessment of Employee Performance and Potential (Performance Management), Career Path Management, and Salary and Compensation Management (Reward Management).

1.2. Workforce (Human Resource) Capability Development

The process of managing employee development encompasses all activities undertaken to shape or build employee skills in order to meet business requirements (Hasibuan, 2002; Garry, 1986).

Development plans are formulated based on inputs from:

1. Job descriptions, which establish the requirements regarding skills, knowledge, experience, and competencies for a specific position.
2. Career path plans, which determine the education and training needs for an individual to assume a specific planned position (if the individual is part of a career path program).
3. Performance appraisals, which identify the education and training needs that should be prioritized to enhance the individual's performance.
4. The individual's own aspirations – specifically, the development plan required based on a competency assessment comparing their existing skills against the skills needed for the role.

Several types of HR development include (Garry, 1986):

1. Self-Development. Self-development refers to efforts or activities undertaken by the individual or employee themselves, whether through formal education (degree programs) or by reading literature and other publications that support the execution of their duties.

2. Company-led development. On-the-Job Training: Competency development activities conducted by a supervisor for their subordinates at the workplace. Implementation of this development can involve job planning, assigning challenging tasks, setting performance standards, and assigning employees from one organizational unit to undergo "on-the-job" training in another unit, with management and monitoring handled by the HR Division.
3. Off-the-Job Training: Employee development activities managed by the Human Resources Division that take place outside the workplace. Off-the-job training includes further education and management training (covering leadership skills, strategic planning, and competency training).

1.3. Human Capital

According to Schermerhorn (2005), human capital can be defined as the economic value of human resources associated with their abilities, knowledge, ideas, innovations, energy, and commitment. Human capital represents a combination of an individual's knowledge, skills, innovation, and ability to perform tasks, thereby creating value to achieve organizational goals. The value-added generated by human capital in the execution of tasks and work contributes to sustainable future revenue for an organization (Malhotra, 2003; Bontis, 2002; cited in Rachmawati & Wulani, 2004).

Stewart et al. (1998), as cited in Sawarjuwono and Kadir (2003), state that human capital is the lifeblood of intellectual capital and a source of innovation and improvement, yet it remains a component that is difficult to measure. Human capital reflects a company's collective ability to generate optimal solutions based on the knowledge possessed by the people within the organization; this capital grows when the company effectively leverages the knowledge held by its employees.

Fitz-Enz (2000) describes human capital as a combination of three factors:

1. characteristics or traits brought to the job—such as intelligence, energy, a positive attitude, reliability, and commitment;
2. an individual's capacity to learn—encompassing intelligence, imagination, creativity, and talent; and
3. the motivation to share information and knowledge—characterized by team spirit and a goal-oriented mindset.

1.4. Innovation Technology

Technology was created to facilitate human work and to perform tasks that humans cannot accomplish (Nurjaya et al., 2021). Human reliance on technology to assist with work tasks fosters the perception that technology can facilitate the completion of work. The same applies to perceptions regarding the benefits of technology; it is believed that technology can enhance work outcomes, leading to better results than previously achieved (Narulita et al., 2022).

The use of technology in human resource development not only affects individuals but also impacts an organization's productivity, efficiency, and competitiveness. Organizations that adopt technology for human resource development.

Innovation can manifest as new ideas, theories, hypotheses, or management methods that business operators or organizations can utilize (Lengkey et al., 2021). Innovation can be

enhanced through experience; as experience grows, new ideas emerge, paving the way for new innovations. This reflects the interconnected relationship between human resources and innovation, given that innovation is generated by skilled and creative personnel. Mobilizing resources to upgrade human resource skills in pursuit of new innovation can be considered an investment for the company in question (Nurcahyanti & Rucitasari, 2022).

Technology and innovation exert a profound influence on economic growth. Consequently, nations possessing modern technology can overcome development gaps by leveraging these technologies to generate new innovations (Setiawati & Alqoodir, 2021). In the long run, technological capabilities enable a company to gather and process various forms of information, thereby yielding significant economic benefits (Sidiq & Astutik, 2021).

1.5. Employee Performance

MBO is a management system in which managers at all levels collaborate to set goals, define responsibilities, and evaluate individual contributions toward achieving expected results within a specific timeframe. Furthermore, MBO is a strategic management technique in which clear, measurable goals are established collaboratively by employees and management, aligning individual objectives with the organization's overall goals.

Managers are primarily responsible for evaluating employee performance through direct observation. Individual discussions between managers and employees are held to review work quality, responsibilities, tasks, and the successful achievement of targets. Salary increases are often linked to positive performance evaluations.

According to Fara Damayanti et al. (2024), performance appraisal is an evaluation process conducted by an organization to measure task execution, accountability, and employee contributions over a specific period, taking into account both qualitative and quantitative aspects. Performance appraisal helps employees understand their capabilities and encourages improvement, while also serving as a basis for management decisions regarding promotions, demotions, or the awarding of incentives.

According to Riva'i and Basri (2005), as cited in the study by Zhafira Aulinasari et al. (2023), performance measurement encompasses several dimensions:

1. Performance Improvement—enhancing the capacity of employees and management to independently take actions that contribute to improved work performance.
2. Compensation Adjustment—providing information to supervisors to help them identify outstanding employees deserving of salary increases, as well as those who may be struggling and require assistance.
3. Placement Decision—enabling the HR department to use assessment methods to determine whether an employee is ready for promotion.
4. Training and Development Needs—identifying opportunities for employees to develop new skills and expand their knowledge.
5. Career Planning and Development—providing guidance to identify suitable talents and interests and to foster career growth.

2. Research Methodology

The research method is a method or technique used in the study. Research methods may be understood as all Reviews those methods / techniques that are used

for conduction of research (Kothari, 2019: 8), or a scientific method used to obtain the data with the purpose and specific uses (Sugiyono, 2021: 2)

The method used in this research is the method of survey research. Sekaran and Bougie (2018: 102) describe the survey methods may be collected information from people who act as resources that can be described, compared and explained the facts relating to people, events or situations.

Furthermore, looking at the type of study (type of investigation), this type of research is verificative research and explanatory research or causal study, because this research aims to find out what and to what extent the factors are thought to influence a variable with the aim of testing a hypothesis (Mudrajat Kuncoro 2017: 12). This research can explain how big the influence of HR development, human capital and technological innovation is on employee performance in public companies.

3. Results and Discussion

3.1. Convergent Validity Test Results

The convergent validity test is used to determine the extent to which indicators represent and measure the construct under study. Convergent validity testing is conducted by examining the loading factor and Average Variance Extracted (AVE) values.

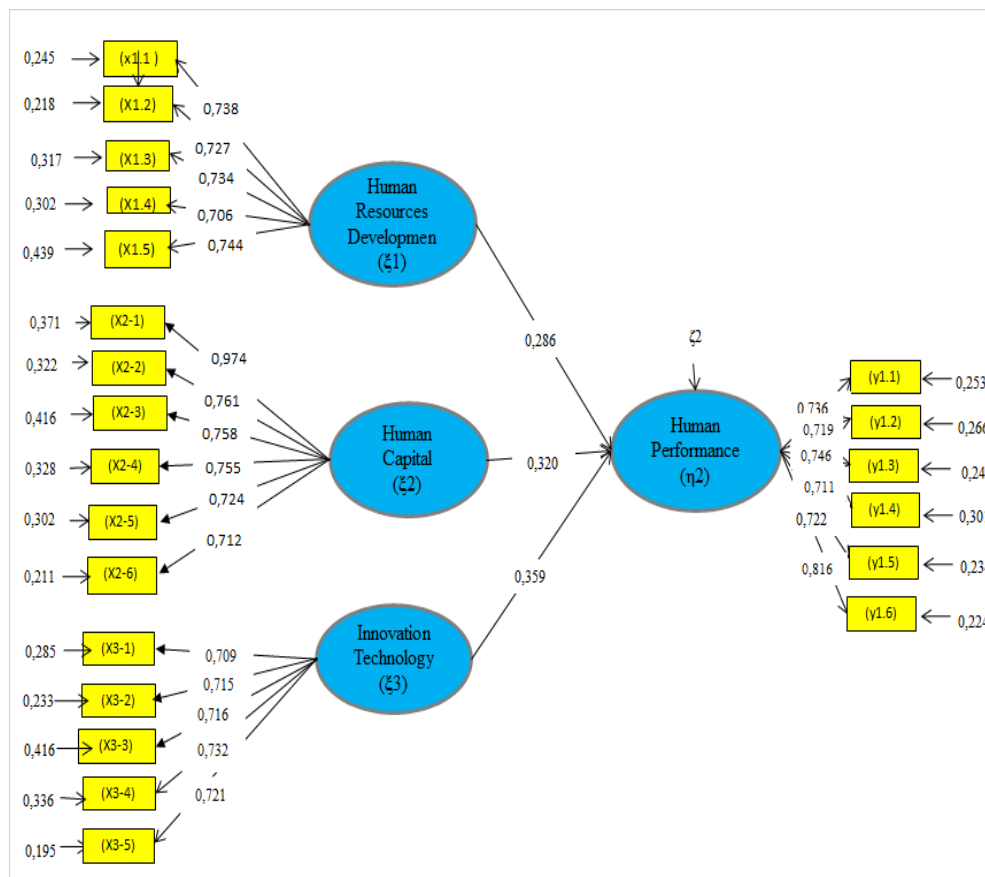


Figure 1. Outer Model

The outer loading results indicate that all indicators for the variables of Human Resource Development, Human Capital, Innovation Technology, and Human Performance yielded valid data (values above 0.7); thus, it is concluded that they are suitable for use in the study. Reliability testing serves to verify the accuracy, consistency, and precision of the instruments used to measure these indicators. Meanwhile, Cronbach's Alpha assesses the reliability of a construct (Nurhalizah et al., 2023). According to Prayudi (2022), a construct is considered reliable if its Composite Reliability (CR) value falls within the 0.7 to 0.8 range (Juli et al., 2024).

Path coefficients-Mean STDEV, T values, p values					
	original sample (O)	Sample mean(M)	Standard deviation (STd)	T statistics (O/STDEV)	P values
HRD - Human Performance	0,286	0.251	0.076	2.751	0.001
HC - Human Performance	0.320	0.312	0.069	3.621	0.000
IT - Human Performance	0.359	0.343	0.062	2.972	0.002

Table 2: *Loading Factor*

Human Resources Developmen (X3)		Human Capital (X2)	Innovation Technology (X3)	Human Performance (Y)	Ket
X1.1	0,738				Valid
X1.2	0,727				Valid
X1.3	0,734				Valid
X1.4	0,706				Valid
X1.5	0,744				Valid
X2.1		0,974			Valid
X2.2		0,761			Valid
X2.3		0,758			Valid
X2.4		0,755			Valid
X2.5		0,724			Valid
X2.6		0,712			Valid
X3.1			0,709		Valid
X3.2			0,715		Valid
X3.3			0,716		Valid
X3.4			0,732		Valid
X3.5			0,721		Valid
Y1.1				0,736	Valid
Y1.2				0,719	Valid
Y1.3				0,746	Valid
Y1.4				0,711	Valid
Y1.5				0,722	Valid
Y1.6				0,816	Valid

3.2. Discriminant Validity Test Result

Discriminant validity can be assessed through the results of the Fornell–Larcker Criterion, HTMT, and cross-loading values presented in the following table.

Table 3. Result HTMT

Measure the construct	Heterotroit Monotroi(HTMT)
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Human Resources Development (X1) → Human Performance (Y)	0,286
Human capital (X2) → Human Performance (y)	0,320
Innovation Technology (X3) → Human Performance (Y)	0,359

Table 4. Convergent Validity Test Result

	Variable Manifes	Bobot Faktor	r
Human Resources Developmen	X1-1	0,738	0,245
	X1-2	0,727	0,218
	X1-3	0,734	0,317
	X1-4	0,706	0,302
	X1-5	0,744	0,439
Human Capital	Variable Manifes	Bobot faktor	r
	X2-1	0,974	0,371
	X2-2	0,761	0,322
	X2-3	0,758	0,416
	X2-4	0,755	0,328
	X2-5	0,724	0,302
InnovationTechnology	X2-6	0,712	0,211
	Variable Manifes	Bobot faktor	r
	X3-1	0,709	0,285
	X3-2	0,715	0,233
	X3-3	0,716	0,416
	X3-4	0,732	0,336
Human Performance	X3-5	0,721	0,195
	Variable Manifes	Bobot faktor	r
	Y1-1	0,736	0,253
	Y1-2	0,719	0,266
	Y1-3	0,746	0,248
	Y1-4	0,711	0,301
	Y1-5	0,722	0,234
	Y1-6	0,816	0,224

3.3. Discussion

The research findings indicate that hypothesis testing confirms human resource development has a significant impact on employee performance. This underscores the fact that human resource management is a crucial factor in achieving organizational goals and driving employee performance. Consequently, companies must effectively manage experienced personnel who possess strong character. To ensure a positive trend in employee performance, companies need to conduct performance appraisals (consistent with the study by Sarfiah et al., 2022). These appraisals can serve as a basis for granting rewards, such as salary increases or promotions (Febrian et al., 2023). Such rewards or compensation motivate employees to continue developing their careers. This highlights the role of Human Resource Management (HRM) in selecting optimal strategies to align the values and goals of both employees and the company, thereby fostering sustainable corporate growth.

Further research findings indicate that human capital significantly influences employee performance. As a form of capital, human capital requires effective management to generate maximum returns for the company; consequently, organizations need to develop strategic human resource management plans to enhance the value added by their employees (Febrian et al., 2023; Nisar et al., 2021). As intangible assets, employee knowledge and skills constitute unique resources that can provide an organization with a competitive advantage over others. It must be emphasized that employees represent an investment—acting to achieve organizational goals—and therefore, HRM practices should focus on effectively engaging and developing employees, or, in contemporary terms, "humanizing" them. Involving employees in decision-making processes and aligning their needs with organizational objectives fosters organizational commitment (Pawirosumarto et al., 2021).

Human capital is a primary determinant of economic performance, influencing both growth and inequality (Balmaceda, 2021). Literature on development economics indicates that human capital is a crucial factor in economic growth (Sultana et al., 2022). Countries possessing superior human resources exhibit higher rates of economic growth (Suhendra, 2020). A third research finding reveals that technological innovation significantly impacts employee performance. This confirms the findings of Sarfiah et al. (2022), suggesting that employee commitment to the organization emerges when work-related stress is low. Furthermore, the rapid pace of technological advancement has made the tasks performed by employees increasingly complex (Febrian et al., 2023). To ensure efficient operational activities, training and development serve as a viable solution (Febrian et al., 2023). Fundamentally, when a company faces a challenge, it strives to overcome it; addressing such challenges requires talented individuals (Febrian et al., 2023).

Employees are more likely to remain with organizations that share their values and goals. These research findings should serve as a consideration for companies implementing human capital strategies to foster a positive organizational climate; doing so can enhance employee performance, thereby indirectly contributing to the company's sustainable and competitive growth. Technology was created to facilitate human tasks and to perform functions beyond human capability (Nurjaya et al., 2021). Human reliance on technology to assist with work fosters the perception that technology facilitates task completion. The same applies to perceptions regarding the benefits of technology; it is believed to improve work

outcomes compared to previous methods (Narulita et al., 2022). Generally, technology is associated with tools that aid in work—specifically tasks involving data and information gathering. Proficiency in technology simplifies work processes and drives innovation, enabling tasks to be completed more quickly, efficiently, and optimally (Indah et al., 2021; Shintia & Riduwan, 2021; Yani et al., 2021).

4. Conclusion

1. Human resource development has a positive effect on employee performance. This indicates that human resource management—carried out through education, training, and the enhancement of individual employee competencies—can influence the development of employee performance.
2. Human capital has a positive effect on employee performance. This indicates that the valuable assets possessed by employees—such as ideas, managerial abilities, and talents that are continuously nurtured and developed—should be prioritized to enhance the company's employee performance.
3. Technological innovation has a positive effect on employee performance. Employees' ability to generate innovations and drive business development in a focused and planned manner can improve employee performance.

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