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Competency and Diversity of Knowledge in Improving Service Performance with Artificial Intelligence-Based Technology as a Moderation

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Abstract. *This study is an explanatory research aimed at examining the relationships among variables, namely service performance, the utilization of AI-based technology, knowledge diversity, and competence. The research object consists of 203 human resources at the Customs and Excise Office of Supervision and Service Type Madya Pabean a Semarang, with a sample of 112 respondents determined using the Slovin formula. The sampling technique applied was non-probability sampling with a convenience sampling method, chosen for reasons of efficiency in time and cost. Data were collected through questionnaires using an interval scale from 1 to 5 and analyzed with structural equation modeling using the Partial Least Square (PLS) approach. The findings reveal that knowledge diversity has a positive and significant effect on service performance, while competence also has a positive and significant effect on service performance. However, AI-based technology does not moderate the effect of knowledge diversity on service performance. On the other hand, AI-based technology significantly moderates and strengthens the effect of competence on service performance. Thus, this study emphasizes the importance of competence and knowledge diversity in improving service performance, as well as the strategic role of AI-based technology as a reinforcing factor in optimizing employee competence.*

Keywords: *AI-based technology; competence; knowledge diversity; service performance.*

1. Introduction

Measuring service performance is a very important initial step in efforts to improve and manage the quality of service systems in public organizations. (Juliastuti et al., 2024) By understanding the current quality of service, customs offices can identify areas for improvement, ensure that services delivered meet user expectations, and adjust strategies based on objective data. This performance measurement encompasses various aspects, such as speed of service, accuracy of information provided, customer satisfaction, and the

level of efficiency in handling existing procedures. (Strohmeier, 2020) Through regular performance evaluations, organizations can gain a comprehensive picture of the effectiveness of their service processes, identify obstacles that hinder optimal performance, and design appropriate corrective actions. (Bakirova Oynura, 2022).

In addition, the results of this measurement also form the basis for establishing operational standards, building a quality-oriented work culture, and strengthening the accountability of officers in providing services. (Collins, 2021). Thus, measuring service performance is not only an evaluation tool, but also a driver for creating more responsive, transparent, and high-quality customs services, thereby increasing user trust and satisfaction.

Companies are required to do better in processing their knowledge to obtain the knowledge needed to offer further services that can satisfy customers. (Bakirova Oynura, 2022). While there is a large body of service quality literature, little empirical research has been conducted to explore the ability of knowledge management to drive service quality. (Tseng, 2016).

Knowledge is a valuable, rare, inimitable and irreplaceable resource. (Castaneda et al., 2018). Knowledge management as an organizational capability that enables the integration of human resources, technology, processes, and strategies within a company to create, use, and share knowledge. (Trunfio & Campana, 2019) Knowledge disparity is the result of a complex interaction of experience variety and expertise disparity. (Star & Stylianides, 2013).

Homogeneity in terms of human resource strategy is seen as more suitable in a human resource system, but what needs to be considered is the agreement and consequences of the practice and application of diversity in the organization and also continuous management over time. (Chen & Liang, 2016). Knowledge has a significant influence on a person's level of trust, which means that the higher the knowledge a person has, the higher the level of trust a person has. (Le et al., 2019).

Competence also plays an important role in supporting performance. (Muxammad & Usibjonovich, 2022). Competent human resources can help strengthen the work team and contribute (Parkhomenko-Kutsevil & Oksana I., 2016) (Parkhomenko-Kutsevil & Oksana I., 2016). Performance competencies that include knowledge, skills, and positive attitudes will influence synergy within the team and have a direct impact on employee performance. (Kotamena et al., 2021).

Previous research on the role of competence in performance remains controversial. This includes research showing that competence has no significant effect on performance. (Hajiali et al., 2022). Competence influences employee performance (Nguyen et al., 2020). The difference in results shows that there is an interesting field of research to be studied. In this study, Utilization AI-based technology offered as a control variable to answer the differences in the research.

The increasing use of cutting-edge technology has increased effectiveness, efficiency, and productivity, as existing and new knowledge within an organization continuously enhances AI capabilities. (Bokhari & Myeong, 2022) As a result, AI can identify redundancies in

business processes and offer optimal resource utilization to improve performance. However, the lack of integration between existing and new knowledge makes it difficult to determine the nature of the knowledge required for AI capabilities to optimally improve organizational performance. (Olan et al., 2022) Therefore, organizations continually face recurring challenges in business processes, competition, technological advancements, and finding new solutions in a rapidly changing society. To address these gaps, this study introduces AI as a control variable.

AI in customs services improves efficiency, accuracy, and customer satisfaction. AI is a tool capable of automating time-consuming administrative processes at a time when the demand for fast and high-quality services is increasing. Document scanning, data grouping, and data verification can be completed quickly with technologies such as robotic process automation (RPA). Furthermore, AI enhances security by detecting fraud and smuggling through the analysis of large data patterns, enabling earlier preventative action.

AI-based chatbots can assist customer service by providing immediate information about regulations and procedures. (Uren & Edwards, 2023), thereby speeding up responses without involving officers for simple questions. Additionally, AI has the ability to analyze demand trends, project service demand, and help manage resources more efficiently. (Kumar et al., 2023). In addition, this technology helps human resource development by identifying more targeted training needs. (Joris Dijkkamp, 2019) With all these advantages, AI enables customs services to maintain the quality and integrity of their services while optimizing the use of their current human resources.

2. Research Methods

In conducting this research study, the type of research used is explanatory research. According to Widodo (2010), explanatory research is explanatory research, meaning that this research emphasizes the relationship between variables by testing hypotheses. The description contains descriptions but the focus lies on the relationship between variables, namely service performance. Utilization AI-based technology knowledge diversity and competence. The researcher chose this method so that the results of this study could be directly applied to the organization where the researcher works.

3. Results and Discussion

3.1. The Influence of Knowledge Diversity on Service Performance.

The research results show that Knowledge Diversity has a positive and significant effect on Service Performance. This result is supported by (Vrontis et al., 2022) which states that when employees gain better knowledge they will focus on service quality. So it can be concluded that the better the utilization of Knowledge Diversity, the better the Service Performance that can be received.

Knowledge Diversity in this study it was measured from the reflection of four indicators namely indicators Variation in perspective, variation in skills, variation in experience, and variation in information. These four elements have been proven to be able to improve

service performance, which in this study is indicated by Service Policy, Human Resources Professionalism, Facilities and Infrastructure, Public Service Information Systems, Consultation and Complaints, and Service Innovation.

The Knowledge Diversity variable with the highest outer loading value is indicated by the skill variation indicator, while the Service Performance variable has the highest outer loading value in the Human Resources Professionalism indicator. This finding confirms that the higher the level of skill variation possessed by individuals in the organization, the better the professionalism of human resources in providing services. In other words, the diversity of skills possessed by employees will expand their ability to complete tasks, adapt to customer needs, and face various work challenges. This condition ultimately increases professionalism, which is reflected in attitudes, competencies, and more optimal service quality. This means that organizational investment in developing diverse skills for human resources not only enriches knowledge, but also becomes a key factor in creating professional, consistent, and highly competitive services.

The analysis revealed that for the Knowledge Diversity variable, the indicator with the lowest outer loading value was information variety. Meanwhile, for the Service Performance variable, the indicator with the lowest outer loading value was the Public Service Information System. This finding suggests that the better the variety of information available and managed, the better the quality of the public service information system. In other words, well-distributed information diversity can enrich knowledge sources, facilitate public access, and improve the speed and accuracy of services. This suggests that the quality of public services, particularly through information systems, is significantly influenced by the extent to which the variety of information managed meets user needs. This means that improvements in the information variety aspect will directly impact the effectiveness of the public service information system and, overall, can improve service performance to the public.

The Influence of Competence on Service Performance.

This study shows that Competence has a positive and significant influence on Service Performance. These results are also supported by Study (Mulang, 2021) which confirms a positive relationship between competence and performance This means that the better the employee's competence, the better the service performance that can be received.

Performance competency in this study is measured by four indicators namely indicators The Ability to Apply Professional Ethics in Every Interaction, Ensure Compliance with Service Standards, and the Ability to Handle Various Situations Appropriately and Responsively. These Three Elements Have Been Proven to Improve Service Performance, As Indicated in This Study. Service Policy, Human Resources Professionalism, Facilities and Infrastructure, Public Service Information Systems, Consultation and Complaints, and Service Innovation.

The performance competency variable with the highest outer loading value is indicated by the ability to deal with various situations appropriately and responsively. Meanwhile, in the service performance variable, the indicator with the highest outer loading value is human

resource (HR) professionalism. This finding implies that the higher the ability of an individual or organization to respond to various situations quickly, precisely, and adaptively, the more professional the HR they possess will be reflected. In other words, accuracy and responsiveness in dealing with situations are important foundations for building a professional image and quality of HR. This also illustrates that individual competence in acting appropriately plays a direct role in improving service quality, so that organizational performance can run more effectively, efficiently, and be trusted by interested parties.

The performance competency variable with the lowest outer loading value is indicated by the ability to apply professional ethics in every form of interaction. Meanwhile, in the service performance variable, the indicator with the lowest outer loading value is the public service information system. This finding implies that increasing an individual's ability to consistently implement professional ethics will contribute positively to the quality of the public service information system. In other words, if every employee or party involved is able to interact with high ethics, then the information-based public service system will run more transparently, accurately, and reliably. This confirms that professional ethics not only impacts interpersonal relationships but also has a strategic influence on the effectiveness and reliability of the service information system, ultimately improving the overall quality of public services.

3.2. The Role of Utilizing AI-Based Technology in Moderating the Influence of Knowledge Diversity in Improving Service Performance.

The test results show that the interaction between AI Based Technology and Knowledge Diversity does not have a significant effect on service performance, so the third hypothesis cannot be accepted. this means that the use of AI-based technology has not been proven to be able to moderate the influence of knowledge diversity in improving service quality.

In this study, performance competency is measured through four indicators: the application of professional ethics, adherence to service standards, and the ability to handle situations appropriately and responsively. Service performance is demonstrated by service policies, human resource professionalism, infrastructure, public service information systems, consultation and complaint mechanisms, and service innovation. Meanwhile, AI-based technology is reflected in its role in supporting decision-making, improving service quality, and streamlining the service administration system.

The Knowledge Diversity variable shows that the skill variation indicator has the largest contribution in describing the diversity of knowledge possessed. Meanwhile, in the Service Performance variable, the most dominant indicator is Human Resources Professionalism, indicating that service quality is greatly influenced by the abilities and professional attitudes of the human resources involved. Furthermore, the AI-based Technology variable shows that the indicator that facilitates the service administration system is the most prominent factor.

However, these findings also confirm that the ease of technology-based administrative systems does not necessarily strengthen the relationship between skill diversity and human

resource professionalism. In other words, while technology can help make service processes more efficient, increased professionalism still relies more on human factors and skill diversity, rather than solely on technological support.

The analysis found that for the Knowledge Diversity variable, the indicator with the lowest outer loading value was information variety. For the Service Performance variable, the indicator with the lowest outer loading value was the Public Service Information System, while for the AI-based Technology variable, the indicator with the lowest value was the ability to improve service quality. These findings indicate that efforts to improve service quality are not yet strong enough to strengthen the relationship between information variety and the success of the Public Service Information System. In other words, even though information diversity exists, it is not able to significantly drive improvements in the public service system if the quality of service produced through AI-based technology is not optimal.

This indicates the need for other, more appropriate strategies to ensure that the existence of a variety of information can truly be integrated effectively into the public service system through technological support that is capable of guaranteeing consistent improvements in service quality.

The use of AI-based technology does not moderate the effect of knowledge diversity on service quality because the characteristics of respondents indicate limitations in its use. The majority of respondents are of productive age (31–40 years old at 43.8% and 20–30 years old at 34.8%), making them relatively adaptive to technology. However, their long work experience (more than 6 years at 65.2% of respondents) makes them tend to maintain conventional work patterns. Furthermore, the education level of most respondents is only a Diploma or Bachelor's degree (88.4%), indicating that their understanding of AI technology is more practical, rather than strategic, for optimizing knowledge diversity. Consequently, even though AI is already being used, its utilization is not yet effective as a strengthening factor capable of bridging knowledge diversity with improved public service quality.

The use of AI-based technology cannot moderate the influence of knowledge diversity on improving service quality because the existing information is often unstructured and difficult to integrate effectively. AI requires high-quality, standardized data to provide accurate analysis, while knowledge diversity can actually create complexity and inconsistency. Furthermore, the success of AI depends heavily on the organization's readiness and human resource capabilities to utilize the technology's output. Consequently, while AI can improve process efficiency, it does not directly strengthen the relationship between knowledge diversity and improved service quality.

The Role of Utilizing AI-Based Technology in Moderating the Influence of Competence in Improving Service Performance.

Hypothesis 4 testing proves that AI-Based Technology significantly moderates the influence of Competence on Service Performance. Therefore, the fourth hypothesis, which states that

AI-Based Technology strengthens the influence of Competence in improving Service Performance, is accepted.

Performance competency in this study is measured by four indicators namely indicators The ability to apply professional ethics in every interaction, ensuring compliance with service standards, and the ability to handle various situations appropriately and responsively. Service performance in this study is indicated by Service Policy, Human Resources Professionalism, Facilities and Infrastructure, Public Service Information Systems, Consultation and Complaints, and Service Innovation. aI based technology in this study is measured from the reflection of five indicators namely indicators as a support tool for decision making, improving the level of service quality, and facilitating the service administration system.

The performance competency variable with the highest outer loading value is the ability to handle various situations appropriately and responsively. This indicates that the speed and accuracy of an individual's response to changing conditions are dominant aspects in shaping performance competency. Within the service performance variable, the indicator with the highest ranking is human resource professionalism, which emphasizes the importance of professional attitudes, skills, and behavior in providing quality service. Meanwhile, within the artificial intelligence-based technology variable, the indicator with the highest value is its ability to facilitate the service administration system.

The performance competency variable shows that the indicator with the highest outer loading value is the ability to deal with various situations appropriately and responsively. This illustrates that an individual's ability to adapt to dynamic conditions is crucial in supporting overall performance. Meanwhile, in the service performance variable, the most dominant indicator is human resource (HR) professionalism. This professionalism encompasses attitudes, work ethics, and skills that support the quality of service provided to users or customers. On the other hand, the AI-based technology variable displays the indicator with the highest value in the aspect of ease of service administration system. With a simple, fast, and effective service administration system, work processes can run more smoothly and efficiently.

These findings demonstrate a close relationship between the ease of use of AI-based administrative systems and an individual's ability to respond quickly and appropriately to various situations. Both contribute directly to strengthening human resource professionalism. This means that utilizing technology that supports service efficiency can improve the reliability and quality of human work. Thus, technology is not merely a tool but also a crucial factor in strengthening employee competence and professionalism in providing optimal service.

The performance competency variable that showed the lowest outer loading value was the indicator of the ability to apply professional ethics in every form of interaction. This indicates that the aspect of professional ethics remains a weak point that requires more serious attention. In the service performance variable, the indicator with the lowest outer loading value was the public service information system, indicating that the quality and

utilization of this information system are not yet fully optimal in supporting effective services. Meanwhile, in the AI-based Technology variable, the indicator with the lowest outer loading value was the ability to improve the level of service quality, which means that the utilization of artificial intelligence-based technology has not been optimal in driving improvements in service quality. This finding implies that efforts to improve service quality play a crucial role in strengthening the link between improving individual competencies, particularly consistency in the application of professional ethics, and the quality of the public service information system. In other words, the better the quality of the service produced, the greater the influence of the application of professional ethics on the effectiveness of the public service information system through the support of AI-based technology.

4. Conclusion

Based on the proof of the hypothesis and discussion, it can be concluded that the answer to the existing research question is: 1. Knowledge diversity has a positive and significant impact on service performance. This means that the better the utilization of knowledge diversity, the better the perceived service performance. 2. Competence has a positive and significant influence on service performance. This means that the better an employee's competency, the better the perceived service performance. 3. AI-based technology does not moderate the effect of knowledge diversity on service performance. The presence of AI-based technology neither strengthens nor weakens the relationship between knowledge diversity and service performance. 4. AI-Based Technology significantly moderates the influence of Competence on Service Performance. AI-Based Technology significantly strengthens the relationship between competence and service performance, so that the higher the utilization of AI-based technology, the greater the influence of competence on service quality.

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