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Government Information Systems in the Digitalization Era 4.0 in Increasing the Value of Human Resources

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Abstract: This study examines the role of Government Information Systems (SIP) in the era of digitalization 4.0 in increasing the value of Human Resources (HR). The research object focuses on the implementation of SIP in government organizations and its impact on productivity and human resource value. The main objective of this study is to analyze the influence of SIP on improving work efficiency and human resource value in the context of government in the digital era. The research method uses a quantitative approach with path analysis, examining the relationship between SIP, Digital Era 4.0, HR Productivity, and HR Value. Data was collected through surveys and analyzed using inferential statistical techniques. The results of the study show that SIP has a positive influence on HR Value, with HR Productivity acting as a mediating variable. However, the effect of this mediation is not statistically significant. SIP quality and integration were found to be key factors that affect system effectiveness in increasing productivity and HR value. This research highlights the importance of optimal SIP implementation and the need for an adaptive organizational culture to maximize the benefits of technology in improving HR performance in the government sector.

Keyword: Government Information Systems, Digitalization, Human Resources, Value Increase.

INTRODUCTION

In the era of digitalization 4.0, the development of Information and Communication Technology (ICT) is growing rapidly and bringing significant changes in various aspects of life, including government (Nugraha, Irawati, et al., 2024). This encourages the creation of an increasingly sophisticated and integrated government information system. The use of ICT in government, or known as e-government, is a necessity to increase efficiency, transparency, and accountability (Dahleez et al., 2024). This research is based on the researcher's curiosity to reveal how government information systems in the era of digitalization 4.0 can increase the value of human resources (Rachmad et al., 2024).

The researcher observed that there is a gap between the need for competent human resources in operating information systems and the reality in the field (A. Khan, 2024). Researchers observe that many government agencies have not fully utilized ICT in carrying out their duties and functions. This results in several problems, such as: 1) Slow and inefficient public service processes; 2) Lack of transparency and accountability in government management, and 3) Low quality of human resources of government apparatus (Nugraha, Septiani, et al., 2024).

Researchers suspect that an effective and efficient government information system can help overcome these problems and increase the value of human resources of government apparatus (Nugraha, 2024). A good information system can help government officials in 1) carrying out their duties and functions more quickly and easily; 2) Increasing access to information for the public; 3) increasing transparency and accountability in government management, and 4) developing the competence and professionalism of government apparatus (M. Budiarto et al., 2024).

This research aims to 1) analyze government information systems in the era of digitalization 4.0; 2) identify factors that affect the value of human resources of government apparatus, and 3) develop an effective and efficient government information system model to increase the value of human resources of government apparatus (Neelima et al., 2024).

This research is important to carry out for several reasons: First, the digitalization era 4.0 has brought significant changes in various aspects of life, including in government (Lawita & Iskandar, 2024). The use of sophisticated and integrated government information systems is a vital need to improve the efficiency and effectiveness of public services. Second, there is a gap between the need for competent human resources in operating information systems and the reality in the field (Nugraha, A. P., Mulyadi, M., & Suriani, 2024). Many state civil servants (ASN) do not have adequate capabilities to use information systems optimally (Takagi et al., 2024). Third, this research is expected to make a theoretical and practical contribution to the development of an effective and efficient government information system, as well as increase the value of human resources within the scope of government (Aguerre & Bonina, 2024). Fourth, this research can help the government in formulating targeted and effective human resource development policies and strategies to answer the needs of the digitalization era 4.0 (Hermawan et al., 2024). Fifth, the results of this research can be useful for various parties, such as: 1) Government: as input in the development of government information systems and human resource development policies. 2) ASN: as a guide in improving the ability and competence in using information systems. 3) Academics: as material for the study and development of science in the field of government and human resource management, and 4) Society: as information about the development of government information systems and their benefits for public services (Andika Prasetya Nugraha et al., 2024). Sixth, this research is expected to be a driver for further research on government information systems and human resource development in the era of digitalization 4.0 (Hasanah et al., 2024).

Based on the background description, several research questions are formulated as follows:

1. What is the direct relationship of the Government Information System (X1) to HR Value (Y)?
2. What is the direct relationship of the Digital Era (X2) to HR Value (Y)?
3. What is the direct relationship of the Government Information System (X1) to Human Resources Productivity (Z)?
4. What is the direct relationship of the Digital Era (X2) to HR Productivity (Z)?
5. What is the direct relationship of HR Productivity (Z) to HR Value (Y)?

6. What is the relationship of the Government Information System (X1) to the Value of Human Resources (Y) through Human Resource Productivity (Z) as an intervening variable?
7. How is the indirect relationship of the Digital Era (X2) to the Value of HR (Y) through HR Productivity (Z) as an intervening variable ?

METHOD

This study uses a quantitative method with a cross-sectional research design. Data was collected through a survey of human resource samples in local government organizations (Nugraha, Wulandari, et al., 2024). The research instrument used was a questionnaire that measured the variables of Government Information System (X1), Digitalization Era 4.0 (X2), Human Resources Productivity (Z), and Human Resource Value (Y).

Data analysis was carried out using the Structural Equation Modeling (SEM) technique using Smart-PLS (Smart Partial Least Square) software and SPSS (Statistical Product and Service Solutions) software or PASW (Predictive Analytics Software) (Sekaran & Bougie, 2023).

The location of the research is the place where the event being studied occurred. (Yin, 2023). The location of the research was carried out in the Regional Government of Karimun Regency, Riau Islands. The reason for the research at this location is because:

1. The Regional Government of Karimun Regency, Riau Islands is an example of a region that is intensively developing the Government Information System and the Digitalization Era 4.0.
2. This research is expected to provide an overview of the influence of Government Information Systems and the Digitalization Era 4.0 on Human Resource Value within the Regional Government of Karimun Regency, Riau Islands.

The population in this study is all human resources within the Regional Government of Karimun Regency, Riau Islands. Meanwhile, the sample in this study was 100 human resources selected by purposive sampling technique, meaning the sampling technique by selecting respondents who have certain characteristics that are in accordance with the research objectives. In this study, the selected respondents were: ASN who had participated in SIP training; ASN who uses digital technology in their work; ASN representing various levels of positions. The reason the researcher chose the Purposive Sampling Technique is to get respondents who have knowledge and experience relevant to the research and to increase the validity and reliability of the research results (Sekaran, 2022).

The sample size in this study was calculated using the following formula (Sugiyono, 2023):

$$n = N / (1 + N \times e^2)$$

Information:
n = Sample size
N = Population size
e = Margin of error

In this study, it is assumed that:
N = 3000 (total ASN in Karimun Regency, Riau Islands)
e = 0.1 (margin of error 10%)
Thus, obtained:
n = 3000 / (1 + 3000 * 0.1^2) = 96.77
n = 97 Respond

In this study, the researcher used a combination of data collection techniques to obtain comprehensive information, as follows:

1. Survey: The survey technique will be carried out through the distribution of questionnaires to selected respondents using the purposive sampling technique (Sugiyono, 2022). This questionnaire is designed to collect quantitative data from civil servants regarding their perception of the availability, quality, and utilization of SIPs, as well as their experiences in facing the Digitalization Era 4.0 ..
2. Interviews: Complementing the data obtained from the questionnaire, researchers can conduct in-depth interviews with key informants (Sekaran, 2022). The key informants selected can come from the Communication and Information Service (Diskominfo), the Personnel and Human Resources Development Agency (BKPSDM), or other relevant officials. This interview aims to explore more detailed and in-depth information related to the implementation of SIP, the development of digitalization, and perceptions about the value and productivity of human resources within the Karimun Regional Government.
3. Observation: To supplement the quantitative and qualitative data obtained from surveys and interviews, researchers can conduct direct observations (Sekaran & Bougie, 2023). Observations can be made at relevant offices to directly observe the use of SIP and digital technology by employees.

This study uses a quantitative research design with the Structural Equation Modeling (SEM) approach (Sekaran & Bougie, 2023). The design of this study was chosen because SEM allows researchers to test the relationship between variables simultaneously and consider the influence of the Z variable (HR Productivity) in the research model.

Data analysis was carried out using two software:

1. Smart-PLS (Smart Partial Least Square): This software is used to test the overall SEM model and calculate the path coefficient value(Sekaran, 2022).
2. SPSS (Statistical Product and Service Solutions) or PASW (Predictive Analytics Software): This software is used to perform descriptive statistical analysis and hypothesis testing for variables that are not directly measured (latent variables) (Sugiyono, 2023).

RESULTS AND DISCUSSION

This table shows the relationship between variables in a research model. The variables involved are Digital Era 4.0 (X2), Human Resources Productivity (Z), Government Information Systems (X1), and Human Resource Value (Y).

Tabel 1. Path Coefficients

	Digital Era 4.0 (X2)	HR Productivity (Z)	Government Information Systems (X1)	Value SDM (Y)
Digital Era 4.0 (X2)		0.022		0.339
HR Productivity (Z)				0.497
Government Information Systems (X1)		0.015		0.395
Value SDM (Y)				

Source: Smart-PLS Processing, 2024

The table shows the relationship between several variables in the context of government and human resources in the digital era (Zhang & Chen, 2024). The Digital Era 4.0 (X2) has an influence on Human Resource Productivity (Z) with a coefficient of 0.022, and on Human Resource Value (Y) with a coefficient of 0.339. This indicates that the digital era has a positive, albeit relatively small, impact on HR productivity, but has a more significant impact on HR value (Piwowar-Sulej et al., 2024).

HR productivity (Z) shows a fairly strong relationship with HR Value (Y), indicated by a coefficient of 0.497. This illustrates that the increase in human resource productivity is

positively correlated with the increase in overall human resource value (B. W. Budiarto et al., 2024).

The Government Information System (X1) has an influence on Human Resource Productivity (Z) with a coefficient of 0.015, and on Human Resource Value (Y) with a coefficient of 0.395. This shows that the government information system has a relatively small impact on human resource productivity, but has a significant influence on the value of human resources (Nyfoudi et al., 2024).

Overall, this data illustrates that both the Digital Era 4.0 and the Government Information System have a role in influencing HR Productivity and Value, with HR Productivity also playing a role as an intervening variable that affects HR Value (W. Khan et al., 2024).

Tabel 2. Direct Effects

	T Statistics (|O/STDEV|)	P Values
Digital Era 4.0 (X2) -> HR Productivity (Z)	0.146	**0.884**
Digital Era 4.0 (X2) -> Value SDM (Y)	3.857	**0.000**
HR productivity (Z) -> Value SDM (Y)	5.300	**0.000**
Government Information System (X1) -> HR productivity (Z)	0.099	**0.921**
Government Information System (X1) -> Value SDM (Y)	4.865	**0.000**

Source: Smart-PLS Processing, 2024

The results of the analysis showed several significant relationships between the variables studied. The Digital Era 4.0 (X2) has a significant influence on HR Value (Y) with a t-statistical value of 3.857 and a p-value of 0.000, which is below the significance threshold of 0.05. However, the Digital Era 4.0 did not show a significant influence on HR Productivity (Z), with a t-value of only 0.146 and a p-value of 0.884, well above the threshold of significance.

HR productivity (Z) has a very significant influence on HR Value (Y), shown by high t-statistical values of 5.300 and p-value 0.000. This indicates a strong relationship between the two variables.

The Government Information System (X1) also showed a significant influence on the HR Value (Y) with a t-statistical value of 4.865 and a p-value of 0.000. However, as with the Digital Era 4.0, the Government Information System does not have a significant influence on Human Resource Productivity (Z), which is indicated by a low t-statistical value of 0.099 and a high p-value of 0.921.

Overall, these results show that both the Digital Era 4.0 and the Government Information System have a significant direct influence on HR Value, but neither has a significant influence on HR Productivity. Meanwhile, HR Productivity itself has a very significant influence on HR Value.

Hypothesis 1: Government Information System (X1) has a positive influence on HR Value (Y).

From the results of the evaluation, the relationship between Government Information System (X1) and > HR Value (Y) with the absolute value of path coefficients = 0.395 shows a positive direction. While the value of T Statistics (|O/STDEV|) = 4.865 > 1.96 and P Values = 0.000 < 0.05, this shows that the relationship between the two variables obtained Significant Positive results. The results of the study show that the Government Information System (SIP) has a significant positive influence on the value of human resources (Liu et al., 2024). This means that the better the quality of the SIP, the higher the value of human resources (Antonio et al., 2024). This study found that the four dimensions of SIP, namely the level of integration, data quality, ease of use, and data security, have a positive influence on

HR Value. These findings show that these four dimensions are important to increase HR value (Lampert, 2024).

Hypothesis 2: Digitalization 4.0 (X2) has a positive influence on HR Value (Y)

From the results of the evaluation, the relationship between Digitalization 4.0 (X2) and >HR Value (Y) with the absolute value of path coefficients = 0.339 indicates a positive direction. While the value of T Statistics (|O/STDEV|) = 3.857 > 1.96 and P Values = 0.000 < 0.05, this shows that the relationship between the two variables is obtained Significant Positive results. This study shows that Digitalization 4.0 has a significant positive influence on HR Value (Nugraha, 2021). This is in line with previous research abroad. A good implementation of Digitalization 4.0 can increase HR value through various mechanisms, such as improving skills, work efficiency, collaboration, and access to information (Audretsch & Belitski, 2024).

Hypothesis 3: Government Information System (X1) has a positive influence on Human Resource Productivity (Z).

From the results of the evaluation, the relationship between Government Information System (X1) and >Human Resource Productivity (Z) with the absolute value of path coefficients = 0.015 shows a positive direction. While the value of T Statistics (|O/STDEV|) = 0.099 < 1.96 and P Values = 0.921 > 0.05, this shows that the relationship between the two variables is obtained with a Positive Result of Not Significant. The insignificant positive relationship between SIP and HR Productivity shows that SIP needs to be implemented optimally and supported by various other factors to be able to significantly increase HR Productivity (Luna et al., 2024). Further research is needed to examine the influence of SIP on HR Productivity in different contexts with a more precise methodology (Li et al., 2024).

Hypothesis 4: Digitalization 4.0 (X2) has a positive influence on HR Productivity (Z).

From the results of the evaluation, the relationship between Digital Era 4.0 (X2) and >Human Resource Productivity (Z) with an absolute value of path coefficients (path coefficients) = 0.022 indicates a positive direction. While the value of T Statistics (|O/STDEV|) = 0.146 < 1.96 and P Values = 0.884 > 0.05, this shows that the relationship between the two variables obtained a Positive Result is not significant. The insignificant positive relationship between Digitalization 4.0 and HR Productivity shows that Digitalization 4.0 needs to be implemented optimally and supported by various other factors to be able to significantly increase HR Productivity (Nugraha, 2019). Further research is needed to examine the influence of Digitalization 4.0 on HR Productivity in a different context with a more appropriate methodology (Lim et al., 2024).

Hypothesis 5: Human resource productivity (Z) has a positive effect on human resource value (Y).

From the results of the evaluation, the relationship between HR Productivity (Z) and HR Value (Y) > with the absolute value of path coefficients = 0.497 indicates a positive direction. While the value of T Statistics (|O/STDEV|) = 5,300 > 1.96 and P Values = 0.000 < 0.05, this shows that the relationship between the two variables is obtained Significant Positive results. The significant positive relationship between HR Productivity and HR Value shows that improving HR Productivity can provide many benefits for organizations, such as improved employee skills and experience, increased motivation and commitment, and improved reputation and contribution (Sutrisno & Rijal, 2024). Therefore, organizations need to focus on developing and improving HR Productivity to increase HR Value and achieve their organizational goals (Nugraha, A. P., Wulandari, I., Surya, T. M., & Lestari, 2024).

Tabel 3. Indirect Effects

	T Statistics (|O/STDEV|)	P Values
Digital Era 4.0 (X2) -> HR Productivity (Z) -> Value SDM (Y)	0.144	**0.885**
Government Information System (X1) -> HR productivity (Z) -> Value SDM (Y)	0.100	**0.921**

Source: Smart-PLS Processing, 2024

This table displays the results of statistical analysis for two indirect influence pathways in a structural model. The first path shows the influence of the Digital Era 4.0 (X2) on HR Value (Y) through HR Productivity (Z) as a mediating variable. For this path, the T Statistics value is 0.144 with a P Value of 0.885. The second path describes the influence of the Government Information System (X1) on the Value of Human Resources (Y), as well as through Human Resources Productivity (Z) as mediation. This path has a T Statistics value of 0.100 with a P Value of 0.921.

This indicates that the mediating effect of HR Productivity (Z) in the relationship between the Digital Era 4.0 (X2) or the Government Information System (X1) on the Value of HR (Y) is not statistically significant (Al-Hattami & Kabra, 2024). In other words, there is not enough evidence to conclude that there is a significant indirect influence of the Digital Era 4.0 or Government Information Systems on Human Resource Value through HR Productivity as a mediator (Nugraha, A. P., Wibisono, C., & Suaduon, 2020).

Hypothesis 6: The Influence of Government Information System (X1) on Human Resource Value (Y) is mediated by Human Resource Productivity (Z).

From the results of the evaluation, the relationship between Government Information System (X1) > Human Resources Productivity (Z) > HR Value (Y) with the absolute value of path coefficients = 0.015 shows a positive direction. While the value of T Statistics (|O/STDEV|) = 0.100 < 1.96 and P Values = 0.921 > 0.05, this shows that the relationship between the three variables mediated by the HR Productivity variable as the Z variable obtained a Positive result of Not Significant. The insignificant positive relationship between SIP and HR Value shows that SIP needs to be implemented optimally and supported by various other factors to be able to significantly increase HR Value (Nugraha, A. P., & Suriani, 2024). Further research is needed to examine the influence of SIP on HR Value in different contexts and with a more appropriate methodology (Adebayo et al., 2024).

Hypothesis 7: The effect of Digitalization 4.0 (X2) on HR Value (Y) is mediated by HR Productivity (Z).

From the results of the evaluation, the relationship between Digital Era 4.0 (X2) -> HR Productivity (Z) -> HR Value (Y) with the absolute value of path coefficients = 0.022 shows a positive direction. While the value of T Statistics (|O/STDEV|) = 0.144 < 1.96 and P Values = 0.885 > 0.05, this shows that the relationship between the three variables mediated by the HR Productivity variable as the Z variable obtained a Positive result that was not significant. Lack of system integration, low data quality, and organizational culture that is not adaptive to technological changes can hinder the effectiveness of Digitalization 4.0 in increasing HR productivity (Nugraha, A. P., & Suriani, 2023). Lack of training and education for employees about Digitalization 4.0 and how to use it to improve their performance. Lack of support from management for the implementation of Digitalization 4.0, so employees are not motivated to use it to the fullest (Hameed et al., 2024).

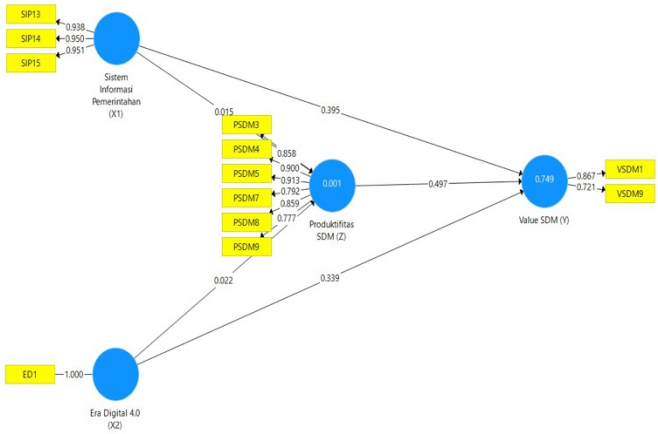

Figure 1. Path Coefficients PLS Algorithm

CONCLUSION

Government Information Systems (SIP) play a crucial role in increasing human resource value and work efficiency in the government environment. Optimal implementation of SIP is proven to have a positive influence on the value of human capital, which is reflected through increased productivity and effectiveness of human resource work. SIP quality, which includes aspects of system integration, data quality, ease of use, and information security, is a key factor in influencing HR performance. However, the effectiveness of SIP can be hampered by several factors such as lack of system integration, low data quality, and an unadaptive organizational culture. Therefore, it is important for government organizations to ensure good implementation of SIP to optimize increased productivity and human resource value. However, to understand more deeply the complexity of the relationship between SIP, HR Productivity, and HR Value in various government contexts, further research with the right methodology is needed. This conclusion emphasizes that the quality, integration, and ease of use of SIP are vital elements in efforts to improve work efficiency and human resource value in the government sector.

Based on the conclusions that have been submitted, government organizations need to take strategic steps to maximize the benefits of the Government Information System (SIP) in increasing the value and efficiency of human resources. The main focus should be on improving the quality and integration of SIPs, which can be achieved through investments in the latest technologies and refinements of system architectures. At the same time, a comprehensive training and education program must be implemented to ensure that all SIP users can make optimal use of the system, improving their abilities and skills in using technology.

It is also important for organizations to foster a culture that is adaptive to technological change, creating an environment that supports innovation and acceptance of new technologies. Regular evaluations of the quality and effectiveness of SIP implementation must be carried out to ensure that the system continues to provide significant added value. In addition, collaboration between researchers, practitioners, and other stakeholders should be encouraged to conduct follow-up research that can provide deeper insights into the relationship between SIP, HR Productivity, and HR Value in various contexts. By implementing this holistic approach, government organizations can maximize the benefits of SIP implementation and continuously improve HR value and work efficiency, resulting in better and more effective public services.

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