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The Influence of Information Technology Competence and Educational Level on Work Productivity at the University

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Abstract

The competence of educational staff in information technology is essential to finishing a job at a university. Good information technology competence can help them complete the work faster and more effectively. This study investigates the influence of communication competence and education level on work productivity at Sebelas Maret University. Two hundred ten respondents were involved, consisting of 125 male and 85 female staff. Pearson correlation is used for validation, and Cronbach's alpha is used for reliability tests. All items are valid and reliable (α =.05.) The data were analyzed using multiple linear regressions. The result shows that simultaneously, the two independent variables have a significant effect on the dependent variable ($F = 9.63$, $p < .05$). Information technology competence has a significant effect on work productivity ($t = 4.64$, $p < .05$). Education level has a significant effect on work productivity ($t = 2.48$, $p < .05$). Generally, it can be concluded that the information technology competence and educational level of staff affect work productivity.

Keywords Information Technology; College; Administrators' Education

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1. INTRODUCTION

Organizational change can be influenced by management and the improvement of digital transformation mastery skills (Maretesani et al., 2023; Montero Guerra et al., 2023). Cross-field competency development is very important to increase company productivity and improve the employability of employees. In educational institutions, information technology plays an important role in getting work done (Patil, 2023) and organizing data centrally through *cloud computing* (Naved et al., 2022). Employee performance is strongly influenced by institutional commitment and leadership ability, which are the basis for action or direction in carrying out tasks (Cai et al., 2019). The organizations' tech talent crisis can compound the ongoing problem of poor completion of information technology work.

Performance improvement strategies need to be pursued by compiling several employee capacity-building programs (Hina et al., 2019) Which emphasizes increasing competence and service capabilities for students and other customers. They are designed programmatically based on priorities to improve institutional performance. The level of employee education affects work productivity in IT-based manufacturing companies, management (Lee & Pang, 2020), plantation industries (Astarina et al., 2020)

and the private sector (Setiadi et al., 2020).

Several studies have explored the impact of information technology (IT) and education level on work productivity. For instance, (Holgeid et al., 2022) Information Technology (IT) development and maintenance activities with the intention that these activities will create results that enable benefits for the organizations. (Jian, 2024) Informatization of logistics information technology professional education has a unique function and value to facilitate learning and work productivity. (Bloom et al., 2014) Indeed, better information technologies (enterprise resource planning (ERP) for plant managers and computer-assisted design/computer-assisted manufacturing for production workers) are associated with greater autonomy and a wider span of control.

However, despite these contributions, there is still a significant gap in the literature concerning the specific context of higher education institutions. Most prior studies have focused on the private sector or manufacturing industries. (Green & Pensiero, 2016; Hina et al., 2019). The present study addresses this gap by investigating how IT competence and educational level influence work productivity within the university, specifically focusing on administrative staff. Furthermore, existing studies often treat education level and IT competence in isolation, failing to examine the combined effects of these variables on productivity.

Higher education institutions in developing countries like Indonesia face unique challenges that can impact the productivity of their administrative staff. These challenges often stem from insufficient resources, slower adoption of digital technologies, and limited access to continuing education opportunities. According to (Montero Guerra et al., 2023) Digital transformation is progressing at a different pace in developing countries, which poses both challenges and opportunities for institutions in Indonesia. While the lack of resources may hinder the implementation of advanced technologies, it also creates an opportunity for innovative solutions tailored to the country's specific needs. Additionally, limited access to continuing education opportunities can be addressed through partnerships with international organizations and online learning platforms, enabling administrative staff to stay current with industry trends and best practices. Overall, navigating these challenges will require a strategic approach that leverages the unique strengths of higher education institutions in Indonesia.

In Indonesia, universities are not immune to these issues. As highlighted by (Naved et al., 2022), cloud computing and other IT advancements have begun to be implemented in educational institutions in Indonesia. However, the full potential of these technologies is often not realized due to the digital skills gap among staff and inconsistent infrastructure support. This creates a situation where administrative efficiency is hindered, affecting overall productivity at these institutions. In order to address these challenges, universities in Indonesia must invest in training programs that focus on enhancing digital skills among their staff. Additionally, improving infrastructure support and ensuring consistent access to technology resources will be essential in maximizing the benefits of cloud computing and other IT advancements. By bridging the digital skills gap and providing adequate support, universities can improve administrative efficiency and boost overall productivity in the educational sector.

The global relevance of studying IT competence and education level in a university context is underscored by the increasing globalization of education and the role of higher education in driving national development. As (Patil, 2023) They are noted that higher education institutions in developing countries are increasingly recognized as key drivers for digital skills and innovation, which are critical for national competitiveness. By examining how these factors influence work productivity in Indonesia, this study sheds light on the importance of investing in IT education and university competence. The findings of this research can provide valuable insights for policymakers and educational institutions on how to better prepare students for the demands of a globalized and digital economy. Addressing IT skills and education gaps can help propel Indonesia towards greater economic growth and

competitiveness on the world stage.

People who are proficient with technology can do things more quickly. Workers can save time and effort by automating common processes with the appropriate software or tools. Technology makes access to information easier. Tech-savvy employees do not need to rely on traditional manual searches or the assistance of others to locate the information they need to finish their tasks promptly. Thanks to various solutions, employees can communicate and collaborate online, even in various places. Technology proficiency increases team productivity by enabling members to participate virtually in talks, meetings, and cooperative projects. In higher education institutions, they are trained to solve problems critically and conduct in-depth problem analysis. This experience will certainly be applicable when they enter the world of work. From this description, it is important to research the influence of information technology capabilities and education levels on work productivity.

The novelty of this research lies in its focus on the administrative workforce within higher education, a relatively underexplored group, and its attempt to measure the joint influence of IT competence and educational level. This study also uses more recent data from a developing country, Indonesia, offering insights into how these factors operate in an academic and administrative context, which may differ from corporate environments studied in previous research.

2. METHODS

This research uses correlational quantitative research methods. Data collection technique using closed questionnaires Research was conducted at the administrative office of Sebelas Maret University, located at Jl. Ir. Sutami No. 36, Surakarta Central Java 57127. Researchers chose the campus as a research site to know the administrative competence of Sebelas Maret, where the smoothness of campus activities is not separated from the smoothness of administrative personnel in completing their tasks. Two hundred ten employees were involved as respondents, including 615 administrative personnel from 8 faculties and one employee of the head office. The sampling technique uses proportional random sampling. The distribution of respondents in each faculty is presented in Table 1. The validity test used product-moment correlation, and the reliability test used the Alpha-Cronbach formula. Data analysis in the study used multiple linear regression consisting of three free variables (information, gender, and education level competencies) and one bound variable, namely work productivity. Prerequisite tests include the normality test, the linearity test, the multicollinearity test, and the autocorrelation test. They are processing all data using SPSS Program Version 26.

Table 1. Respondent Description

Faculty	Number of employees	Sample	
		M	F
Student and Academic Bureau	24		11
Faculty of Economics and Business	62	15	
Faculty of Cultural Sciences	44	13	11
Faculty of Social and Political Sciences	51	11	14
Medical Faculty	115	22	13
Faculty of KIP	129	25	
Faculty of MIPA	50	12	13
Faculty of Agriculture	60	13	12
Faculty of Engineering	80	14	11
Total	615	210	

The variables in the study consist of one bound variable (work productivity) and two free variables (information technology competence and education level). All statements are measured using the Likert scale, with the assessment range being strongly agree (5) and strongly disagree (1). The information technology competency variable consists of two indicators: the application of 10 items of information technology and the technology of social media (11 items), for a total of 21 items. Item number 6 has a correlation significance >0.05, so we forced the item to be removed so that it only uses 20 items with reliability test results of 0.90. The variable work productivity consists of 4 items with validity test results between 0.72 and 0.90 (valid all) and a reliability value of 0.84.

The model in the study used descriptive statistics and compared responses from individual backgrounds. In such models, where work productivity is defined as a dependent variable, it is analyzed using multiple linear regression targeting certain indicators, namely the competence of information technology and education level. The hypothetical model of this study is presented in Figure 1.

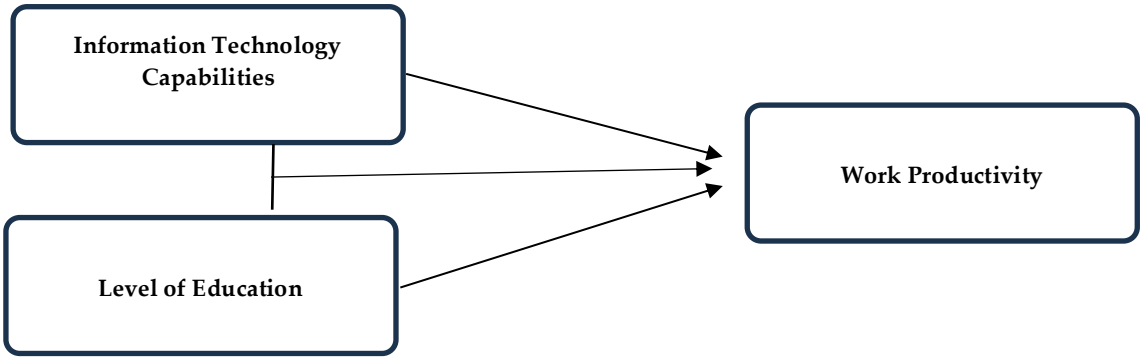

Figure 1. The relationship between a free variable and the variable is bound

3. FINDINGS AND DISCUSSIONS

The statistical description is the initial finding in this study. Table 2 shows the distribution of work productivity, information technology competencies, and education level. Generally, the productivity of the education workforce is high (4.29 on a scale of 5). This shows that the work at Sebelas Maret University shows good productivity. Information technology competence shows a relatively high value (4.24 on a scale of 5). More data is presented in Table 2.

Table 2. Statistics Description

Variable	Min	Max	Mean	Median	SD	Average SD
Variable dependent						
Work productivity	3.00	5.00	4.29	4.25	4.00	0.53
Variabel independent						
Information technology capabilities	3.75	5.00	4.24	4.15	3.90	0.35
Level of education	1.00	4.00	2.46	3.00	3.00	0.91

Researchers conducted multiple linear regression tests to test hypotheses 1, hypotheses 2, and hypotheses 3, which included two free variables, information technology competence and education level, and one variable bound to work productivity. Hypothesis 1: All three free variables significantly influence work productivity ($F = 9.63$, $\alpha<0.05$). Table 3 shows that the correlation coefficient is positive

(0.17), which is in line with the productivity of the work. In Hypothesis 2, the competence of information technology significantly influences dependent variables (t = 4.64, $\alpha < 0.05$), and Hypothesis 3. The education level significantly affects the dependent variable (t = 2.48, $\alpha < 0.05$). All two variables have a 56% meaning; other factors outside this research-free variable influence the rest (44%).

Table 3. Hypothesis test using multiple linear regression

Variable	Koefisien korelasi	Uji t	Sign	F	Sign	R^2	Adj R^2
Konstantin	5.223						
Information technology competency	0.174	4.64	0.000	9.63	0.00	0.45	0.40
Level of education	0.437	2.48	0.000				

***Hypothesis* 1**

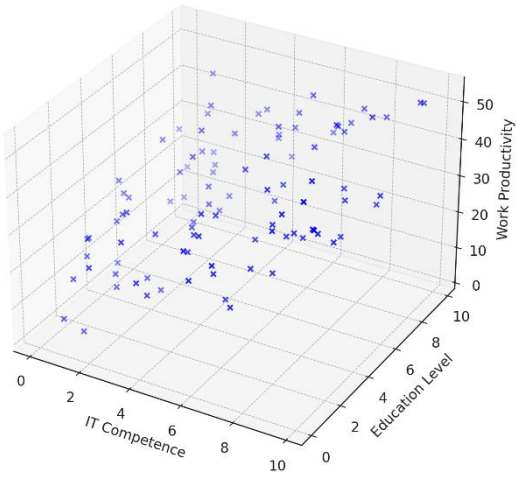

Figure 2. Simultaneous Impact of IT Competence, Education Level, and Years of Experience on Work Productivity

The 3D plot above illustrates the impact of IT competence, education level, and years of experience on productivity. Each data point represents the combined effect of these three independent variables on productivity. The x-axis shows the **IT competence** scores, the y-axis shows the **education level**, and the z-axis represents the **work productivity**. The scatterplot demonstrates that higher values for IT competence and education level generally correspond with increased work productivity. This simultaneous effect highlights that each factor contributes positively to productivity, as seen by the upward trend in the z-axis (work productivity) as IT competence and education level increase.

***Hypothesis* 2**

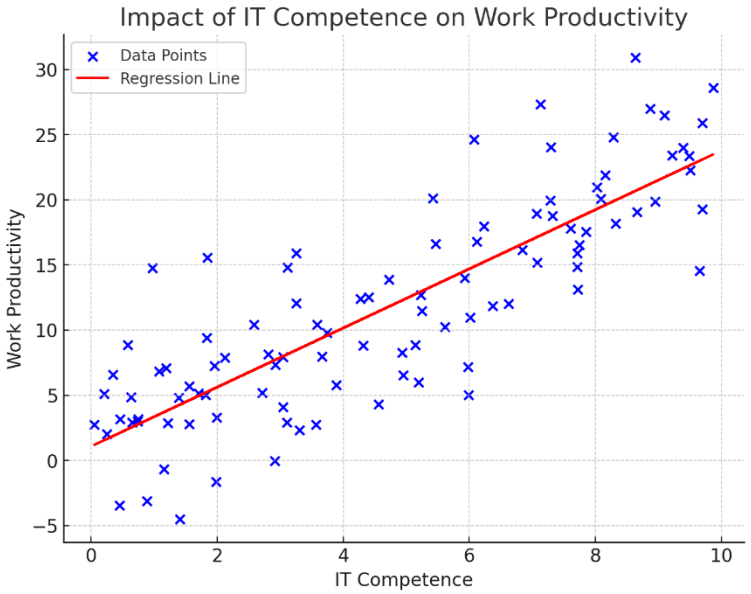

Figure 3. Impact of IT Competence on Work Productivity

The blue dots represent the individual data points, showing the relationship between IT competence and work productivity for each participant. The red regression line demonstrates a strong positive relationship between IT competence and work productivity. The upward slope of the regression line indicates that higher levels of IT competence are associated with higher work productivity. This visual confirms that as IT competence increases, work productivity improves. The linear relationship suggests that IT skills significantly influence an individual's ability to perform effectively at work.

Hypothesis 3

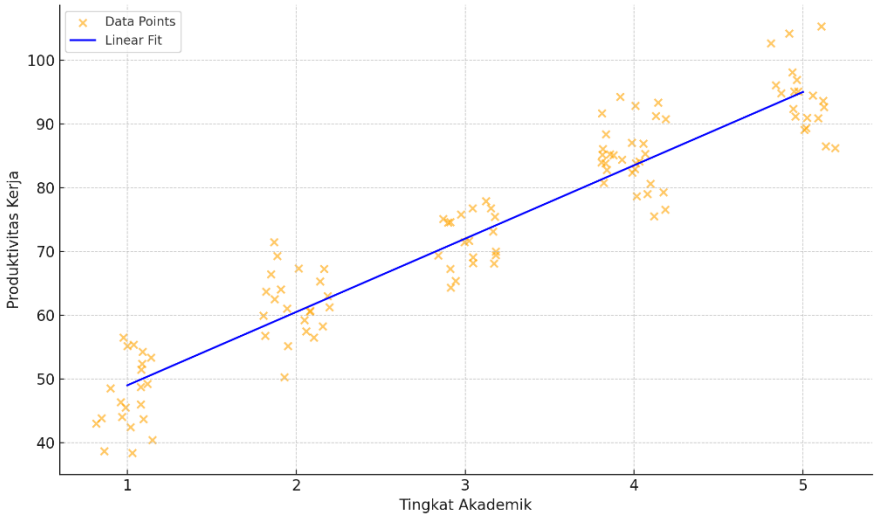

Figure 4. Impact of Education Level on Work Productivity

The orange dots represent individual data points, showing the relationship between education level and work productivity. The blue line is the regression line, demonstrating the estimated relationship between education level and work productivity. The slight upward slope of the regression line indicates a **positive correlation** between education level and work productivity, though the impact

is moderate compared to IT competence. This suggests that work productivity improves as education levels increase, but the effect may not be as strong as other factors like IT competence.

Discussion

The findings of this study align with previous research that emphasizes the critical role of information technology (IT) competence in enhancing work productivity. For example, (Neziraj & Berisha Shaqiri, 2018) Highlighted that IT competence facilitates decision-making processes and accelerates the overall efficiency of operations in organizations. In a higher education context, (Turalbayeva et al., 2021) Using IT tools effectively can lead to better data management, more efficient communication, and improved collaboration among faculty and students. This, in turn, can result in higher student satisfaction, increased academic performance, and a more streamlined learning experience overall. (Sloot et al., 2024). Therefore, investing in IT training and resources for staff and students is crucial for maximizing the potential benefits of technology in educational settings. By promoting IT competence, institutions can create a more dynamic and productive learning environment that prepares students for success in an increasingly digital world.

However, while this study supports these prior conclusions, it also provides new insights into how IT competence interacts with education level to influence work productivity. Previous studies, such as that of (Toader et al., 2018) Have shown that ICT infrastructure positively impacts economic growth in EU countries. (Sylqa, 2022) Find improved statistically significant relationships between *information technology* items and organizational learning as a business performance. Our findings extend this by showing that, within the context of administrative staff at a university, IT competence significantly boosts productivity regardless of the level of education. These results suggest that investing in IT training and development for employees can increase efficiency and output, regardless of their educational background. This highlights the importance of continuously updating IT skills in the workplace to adapt to the rapidly changing technological landscape. By bridging the gap between IT competence and education level, organizations can maximize the potential of their employees and ultimately drive overall success in their operations.

Moreover, this study adds to the discourse by focusing on the educational context in a developing country like Indonesia. In contrast to studies conducted in more developed regions (Marchesani et al., 2023) This research suggests that the impact of IT competence on productivity may be even more pronounced in environments where digital transformation is still in progress. (Salkić et al., 2023) Integrating information technology, data usage, analytics, and digital transformation of the financial sector and ensuring digital inclusion and cyber security can enhance efficiency, transparency, and stability. This finding is in line with (Montero Guerra et al., 2023) Who discussed how digital transformation can create challenges and opportunities for organizations in developing countries. By highlighting the significance of IT competence in enhancing productivity in a developing country like Indonesia, this study contributes valuable insights to the existing literature on digital transformation. Future research could further explore the specific mechanisms through which IT competence influences productivity in such contexts, ultimately informing strategies for organizations to leverage technology effectively in their operations.

IT (information technology) competence and education level can significantly influence productivity. The four indicators of work productivity used in this study include output per hour, use of technology, efficiency of resource use, and error rate. Appropriate software and technological tools can automate routine tasks and speed up work processes, increasing efficiency and reducing errors (Haislip & Richardson, 2018). Good IT competence enables individuals to access information more quickly and accurately (D. Fonseca et al., 2017). It also helps better and more effective decision-making (Neziraj & Berisha Shaqiri, 2018). Higher levels of education tend to bring broader knowledge and greater skills in various fields (Green & Pensiero, 2016), which can be applied to improve the quality of work. A good education trains individuals in analytical and problem-solving skills (Elvira et al., 2015)

that are essential for overcoming workplace challenges and increasing productivity. A good education includes good communication skills (Ismet, 2018), which are essential for working with teams and collaborating well. This is stated by research (John et al. et al., 2022), which states that education and information technology have a positive relationship with labor productivity. Likewise, research (Toader et al., 2018) shows that ICT infrastructure positively and strongly affects economic growth in EU member states.

IT competence partially has a positive and significant effect on work productivity. This research is influenced by the automation of software use, access to information, collaboration, and data analysis. Automation. The ability to use the right IT software and tools can automate (Prat, 2022; Said Ghaleb, 2017) Many routine tasks as well as reduce human error and speed up processes, which in turn increases productivity. Access to information IT competencies enable individuals to access the information they need quickly. This can conventionally shorten data search time by switching from paper to technology such as AR-QR. (Liu et al., 2023). Collaboration. Technologies such as collaborative software (David et al., 2023), online communication tools (Norton et al., 2020), and cloud-based platforms (Meng et al., 2023) Allow teams to work together efficiently, even in different locations. This increases productivity in terms of team collaboration. Collaborative software is now an important part of the technology workforce due to the increasing need for software solutions in the smart city 5.0 industry that exceed performance standards without sacrificing cost-effectiveness. (Akter et al., 2023). Data Analysis. Collecting, analyzing, and making data-driven decisions is key in various fields. IT competencies can assist individuals in better analyzing data. (Van Der Voort et al., 2021) To identify trends and opportunities.

The level of education partially has a significant influence on the work productivity of individuals. Education is an investment in oneself and a valuable asset in the work environment (Abdel Hadi et al., 2023). Education level affects work productivity by providing individuals with the knowledge and skills necessary to perform job duties better. Higher education, in particular, often involves deep learning in a specific field (Choi et al., 2023), which can help individuals understand complex concepts and adapt to rapid industry developments (De Schepper et al., 2023). This could mean the ability to design more innovative products (Guo et al., 2022), better analyze data, or tackle more complicated problems. In addition, higher education encourages individuals to think critically (Hart et al., 2021) and make better decisions. This ability is invaluable in work environments, where individuals often face challenges and problems requiring smart solutions (Kafri, 2022). Furthermore, higher levels of education often allow individuals to develop better communication skills (Kocak et al., 2021), including the ability to write, speak, and communicate with colleagues, clients, and superiors. Communication skills can help articulate ideas, design effective reports, and forge strong working relationships (Abaci, 2022), contributing to productivity and career success.

Gaining a deeper comprehension of how to use tools and software to solve issues is often necessary to become a technology master. Workers may be able to deal with obstacles at work more swiftly and skillfully as a result. Additionally, mastering technology offers the chance to raise output, effectiveness, and quality of work. Employees can maximize their usage of the tools and software and get better results if they understand them. Furthermore, having a strong grasp of technology enables employees to quickly adjust to rapidly advancing technologies, keeping them competitive and relevant in today's cutthroat job market. Individuals are more likely to possess information and skills related to their work the more educated they are. This enables the person to perform their job duties more effectively and efficiently. Furthermore, having a high degree of education might make it easier for an individual to adjust swiftly to advancements and changes in technology at work, boosting productivity.

4. CONCLUSION

This study has several important implications for both higher education institutions and

policymakers. The findings highlight the critical role of IT competence and education level in improving work productivity among university administrative staff. Institutions should invest in IT training programs and continuing education opportunities to maximize productivity. Additionally, policymakers should consider the development of guidelines and support mechanisms to enhance digital literacy and education for administrative staff in higher education settings. By prioritizing these areas, universities can better equip their employees with the necessary skills to adapt to rapidly changing technology and effectively contribute to the institution's overall success. Ultimately, this investment in IT competence and education level will benefit individual staff members and increase efficiency and innovation within the higher education sector.

However, this study also has its limitations. First, it is focused on a single university, which limits the generalizability of the findings. The specific organizational structure and digital environment at Sebelas Maret University may not fully reflect other institutions. Second, while the study examined two important variables—IT competence and education level—other factors that could influence productivity, such as leadership style, organizational culture, and job satisfaction, were not included. This may have resulted in an incomplete understanding of the factors that impact productivity in academic settings. Future research should consider incorporating more variables for a more comprehensive analysis. Additionally, conducting similar studies in multiple universities could help to determine if the findings are consistent across different institutions. By addressing these limitations, researchers can better understand how various factors affect productivity in higher education environments.

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