

# The Role of E-Government and Digital Skills in Enhancing Efficiency and Productivity in Regional Public Administration: The Case of the Peloponnese Region

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Digital modernization in the public sector constitutes a fundamental prerequisite for the development of citizen-centric services, the simplification of administrative procedures, and the enhancement of the overall efficiency and effectiveness of public administration. The adoption of Information and Communication Technologies (ICTs), combined with the systematic development of employees' digital skills, enables public organizations to leverage data, automation, and connectivity in order to deliver more flexible, transparent, and innovative services. Within this context, the present study aims to examine the role of e-government—placing particular emphasis on the development of digital skills—in enhancing the efficiency and productivity of employees in Regional Self-Government. Given the geographical particularities and regional disparities of Greece and considering the limited empirical research focusing on second-level Local Self-Government in the Peloponnese, there is a clear need to investigate the digital skills required for the effective performance of administrative duties, as well as their contribution to improving employee efficiency and productivity in the Region of the Peloponnese. To address this research gap, a quantitative research approach was adopted, using data collected through a structured questionnaire designed based on an extensive literature review and aligned with the study's research questions. The sample was selected using simple random sampling. The study explores the digital skills that employees of the Peloponnese Region consider essential for the effective execution of their duties, along with the perceived contribution of ICT to improving efficiency and productivity within regional public administration. The analysis of the findings highlights the importance of key digital competencies, including skills related to searching for and utilizing information on the Internet, communication and collaboration through digital media, effective use of office application software, and the creation and presentation of digital content. Additionally, competencies related to safe internet use and the management of cybersecurity threats are identified as particularly critical, while data analysis skills appear to be more moderately developed among employees.

*Keywords:* Information and Telecommunications Technology (ICT), digital skills, efficiency, productivity, human resources, regional public administration

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## Introduction

In today's fast-paced world, the effective use of Information and Communication Technologies (ICTs) has become essential for the public sector to enhance its services, improve its operational efficiency, and respond to the evolving needs of citizens. The Peloponnese Region, as a public sector organization in Greece, is under pressure for its digital modernization with the advent of digital technologies. This quantitative research assesses the impact of ICT and digital skills on efficiency and productivity, factors of critical importance for a dynamic and sustainable development of the Peloponnese Region.

E-government has the potential to contribute substantially to the efficiency and productivity of public sector organizations. Through data-driven decision making and streamlined processes, digital technologies can improve service delivery, reduce costs, and optimize resource allocation (Cascio & Montealegre, 2016). Through the analysis of relevant metrics and employee feedback, this study aims to ascertain the impact of e-government on the performance of the Peloponnese Region and identify areas where further improvements can be made.

For the effective application and utilization of digital skills, certain conditions must be met. These include appropriate infrastructure, organizational culture that promotes innovation, availability of necessary resources, supportive policies and regulations, and employee readiness to adopt digital technologies (Scott & Grattion, 2016). This research seeks to evaluate the necessary digital skills as a basic condition for the successful implementation of digital tools, which ultimately lead to better quality service provision, increased productivity, and improved employee efficiency.

## Theoretical Framework

The rapid integration of technology into all facets of life has transformed how people live, work, conduct business, and interact with their governments. There is now a genuine chance to "reinvent" the government for the first time since the establishment of the contemporary welfare state. Governments are discovering, with the aid of large IT (information technology) suppliers, that they can accomplish a comparable change by utilizing the same ideas and tools that are driving the e-business revolution. They understand that they must alter their operations to give citizens more services and information. As a result, e-government emerged (Silcock, 2001).

The penetration of modern Information and Communication Technologies gives priority to the provision of services, from the public or private sector to the citizens, in a continuous, uninterrupted, and customer-centric manner (Mergel, Gong, & Bertot, 2018). Digital transformation (digital transformation) is a continuous process, which aims to improve an organization or an entity (of the state apparatus or even an individual public service) through the activation and initiation of significant changes in all dimensions of the organization, which implemented through combinations of information, computing, telecommunications, and connectivity technologies (Vial, 2019).

Defining the concept of digital technologies, they consist of the combination of information, computing, communication, and connectivity (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013). Such is the interaction and identification of the above technologies that their common name has prevailed with the characteristic acronym "SMACIT", which is used to describe very powerful readily available technologies, such as technical intelligence, robotics, virtual reality, etc. (Sebastian et al., 2017).

Information and Communication Technologies education refers to the set of IT skills that enable active participation in a society. Technological literacy requires a deeper understanding of digital technology and refers to both user skills and technical computing abilities (Madalina, 2021).

Regarding digital skills, their definition may differ depending on the goal, the audience, and the context (Y. Kauffman & D. Kauffman, 2017). Digital skills are defined as the skills required to use the Internet, getting the most out of it and considering the factors that may affect them, such as gender, age, and level of education (van Deursen, van Dijk, & Peters, 2012).

Digital skills include actions for the correct use and management of IT applications and are used effectively to evaluate, store, present, and exchange information and relate to responsible communication and participation in collaborative virtual networks (Bolbito, 2018).

Efficiency is a fraction that shows the resources we bring in versus the resources we take out of the business. Efficiency can be enhanced by achieving better and more results using fewer resources (Oztas, Guzelsoy, & Tekinkus, 2007). For economists, the critical criterion applied to evaluations of policies and programs is economic efficiency. Essentially, overall economic efficiency is attained when individuals in society maximize their utility, given the resources available in the economy. In other words, an increase in economic efficiency improves the wellbeing of the members of the community—the ultimate goal of most policy or regulatory endeavors.

Efficiency requires reducing the number of unnecessary resources used to produce a given output. It is a measurable concept that can be determined using the ratio of useful output to total input. It minimizes the waste of resources, such as natural materials, energy, and time, while achieving the desired performance. Efficiency improves productivity as results are produced in less time and at less cost. Saving resources increases competitiveness and sets higher goals resulting in the growth of the economy.

The measurement of labor productivity, known as the labor productivity index, considers the output produced in relation to the human resources involved. This indicator is influenced by several factors, including the organization of work. At the macro level, factors such as economic stability, employment rates, and infrastructure also play a role, while at the micro level, technology, employee knowledge, management strategies, and competition play a role. When employees actively contribute to the completion of their work, face challenges, and experience moral and material satisfaction from the result, they tend to feel a high level of job satisfaction. The combination of all these factors ultimately leads to an increase in productivity.

Also, achieving high productivity leads to better pay, a higher standard of living, better benefits for employees, and a high level of growth and prosperity for the organization. The concept of productivity is perhaps the most important for an economy and society, since it is a key factor in improving the competitiveness of an economy and consequently the well-being of a society (Savran & Tonak, 1999). The improvement of productivity is the result of the better organization of a business, as well as the utilization of modern technology and other parameters that contribute to the improvement of the overall performance of an organization.

An employee can contribute to increasing productivity in the organization he works for by taking advantage of the opportunities given to him to develop his knowledge and skills inside and outside his workplace, by applying the standards that apply to the company where he works and by planning the tasks that has to deal with, making full use of the possibilities offered by the technology at his disposal and especially the Information and Communication Technologies.

### **Aim**

For the realization of the goal, the role of Digital Skills for Improving the Efficiency and Productivity of Employees of the Peloponnese Region was chosen as a case study. The purpose of this study is to investigate reality using techniques and methods that capture it objectively and impartially.

Four criteria were identified for the study of the Peloponnese Region:

- Human resources;
- Partnerships and resources;
- Administrative procedures;
- Digital skills,

which are interrelated influencing factors in the adoption and success of digital technologies with the aim of increasing the above requested economic sizes. Human resources include the skills, abilities, and attitudes of employees. Partnerships and resources include collaboration with external stakeholders, allocation of resources, and access to necessary infrastructure. The administrative procedures concern the efficiency and effectiveness of the operational procedures of the region. Digital skills refer to the ability and proficiency of employees to use digital tools and technologies.

So, the aim is to investigate the level of administrative functioning of the Peloponnese Region as a case of a public organization that integrates and implements public policies for its digital modernization, through the extensive use of Information Technology and Communications, which in turn require the development of relevant digital skills. It is also attempted to determine if Information and Communication Technologies is the main reinforcing force for increasing the productivity and efficiency of services, so as to lead to the wider provision of quality electronic services to the citizen, to strengthen democracy and to support public policies.

A basic condition for the substantial upgrading of digital skills in Regional Self-Government, and specifically in Level 2 Local Self-Government, is the cooperation with strategic training bodies for civil servants and Local Self-Government employees, for effective training actions, which include and specialize the digital strategy transformation of the Public Administration.

### **Methodology**

Initially, the theoretical framework was examined through the bibliographic review and the thorough research of the current legislation that governs e-government through the use of digital tools in the Public Administration in Greece generally, as well as the digital skills and abilities of the human resources and the main research questions were defined which also delimit the contribution of the present research to the existing reality. The research aims to study those digital skills that are considered necessary for the more efficient performance of employees' duties. The impact of e-government on improving the efficiency and productivity of employees of the Peloponnese Region is also investigated, to lead to results and useful conclusions for the effective and efficient implementation of digital tools that upgrade the digital capabilities of its employees.

The research was carried out in June 2023 using an online questionnaire for the employees of the Peloponnese Region. The entire research conducted was based on the tool provided by the Google platform, "Google Forms", through which a structured questionnaire was formulated. For the selection of the sample, the method of simple random sampling was followed. Based on the available literature, sampling corresponds to the process of collecting observations from a random sample, which is a part of the individuals of a random

population. By using this specific method, representativeness is ensured in terms of the characteristics of the population under consideration.

A total of 206 questionnaires were collected among 750 permanent, Private Law fixed and permanent employees and Community Service employees, consisting of 37 closed-type Likert scale questions, as well as multiple choice questions. The 32nd multiple-choice question formed the basis of the first research question and was answered with furthermore specialized analysis since more specialized knowledge in digital technologies is required.

After the data was collected, the statistical processing followed with the statistical packages SPSS 25 and JASP 0.17.0. The reliability of the research instrument was assessed using the Cronbach index. The results indicate a high level of internal consistency between the items of the scale, with a Cronbach's Alpha coefficient equal to 0.923. The value of the coefficient indicates that the scale items are highly correlated with each other, indicating that they measure the same underlying construct. The high reliability coefficient provides strong evidence for the internal consistency and stability of the research instrument.

The results of the statistical tests of normality, performed through the Kolmogorov-Smirnov and Shapiro-Wilk tests, show that statistically higher values indicate a distribution that is closer to normality.

The review of relevant literature guided the formulation of research hypotheses, to draw conclusions that confirm or reject the theory. The research questions that this research is asked to answer are the following and are accompanied by the following multiple-choice answers, in percentages:

1. What digital skills do the employees of the Peloponnese Region consider necessary for the effective performance of their duties?

Percentages of digital skills, considered essential for effective job performance, were investigated. In general, a high percentage (39.80%) is observed in the ability to communicate and collaborate through electronic media, underlining the importance of online communication in the modern environment of public administration. They are followed by the ability to use word processing and presentation software (20.40%) and data analysis (16.50%), while the percentage for safe use of the internet (2.90%) is the lowest. The percentage (5.80%) that chooses all digital skills is also interesting, indicating an integrated approach.

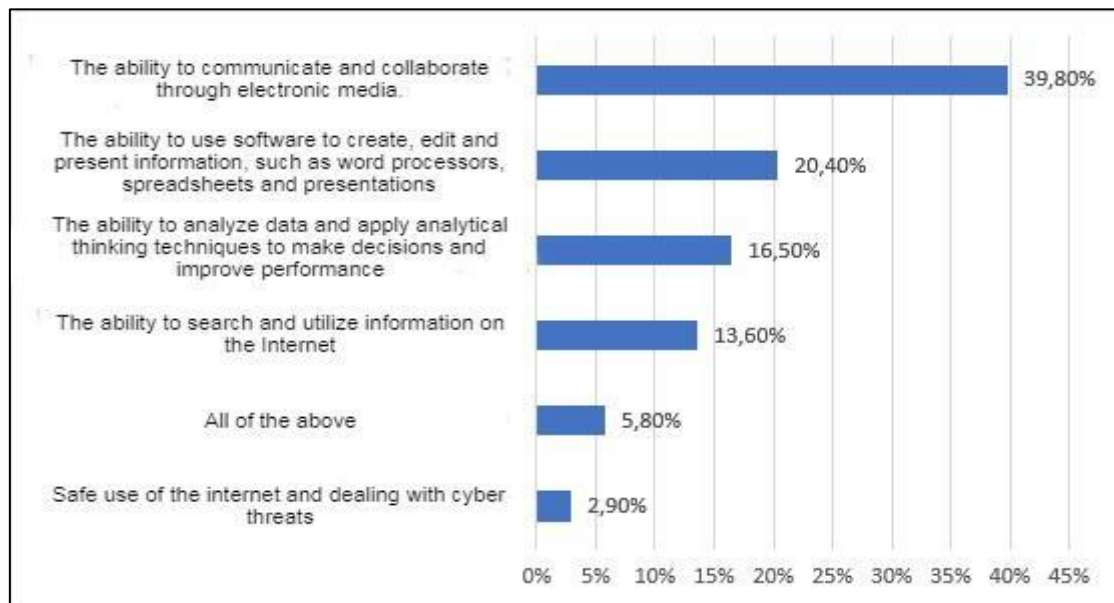


Figure 1. Digital skills necessary for the effective performance of official duties.

2. Does the use of ICT and digital skills contribute to improving the efficiency and productivity of the employees of the Peloponnese Region?

The views of employees of the Peloponnese Region regarding the use of Information and Communication Technologies (ICTs) and digital skills to improve efficiency and productivity were investigated. First, a high percentage of 86% (44% + 42%) who consider that the use of ICT contributes significantly to efficiency, underlines the critical importance of these technologies for the proper execution of tasks. Furthermore, a significant percentage of 57% is observed regarding the value of the use and maintenance of technical equipment for digital transformation, while 43% recognize their contribution to increasing productivity. Also evident is the lack of indicators to evaluate the effectiveness of administrative procedures, with 34% answering “Not at all” and 36% “A little”, indicating the need for the development of indicators. Finally, the moderate assessment, overall 66% (34% + 32%) for the impact of internet and e-government applications on the effectiveness of administrative processes indicates the need for further evaluation and strengthening of digital processes in the sector.

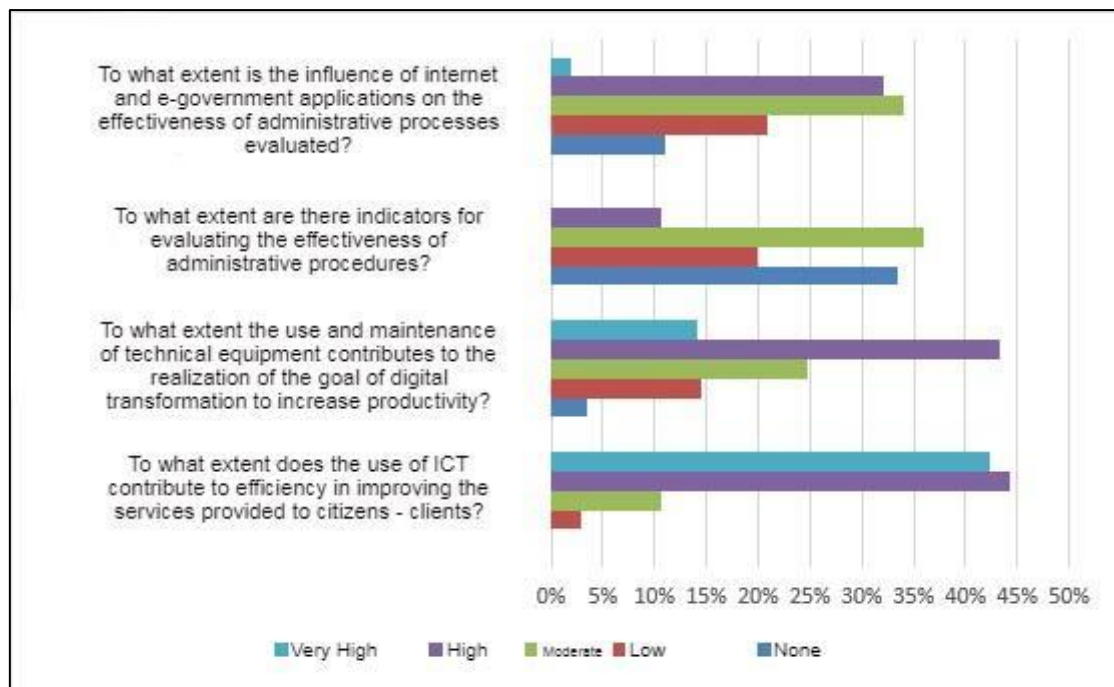


Figure 2. Contribution of ICT and digital skills to improving employees' efficiency and productivity

## Results

### Results About Digital Skills

With reference to the first research question regarding the necessary digital skills considered necessary, the participants consider the ability to communicate and collaborate through electronic media (39.80%) to be most important, followed by the ability to use software, mainly a word processor and spreadsheets (20.40%). The ability to analyze data (16.50%) and search for information (13.60%) are rated lower, which indicates a rather bureaucratic type of work, involving specific actions rather than decision-making.

Questions were asked about the extent to which changes in the external environment are considered in goals and processes, the evaluation and review of processes, the effects of new digital applications on employees and

their skills, and the relationship of digital skills development to the educational level of employees. We first focus on sample descriptive statistics that provide information about the central tendency and dispersion of responses in the sample.

For the extent to which changes in the external environment and objectives are considered when evaluating management processes, the mean of responses was 2.91 with a standard deviation of 0.961. This shows a relatively moderate—neutral attitude and some variability in responses.

The responses for the degree of evaluation and revision of administrative procedures moved a little lower, because of their efficiency. The average value of the responses reached 2.57 and the standard deviation reached 0.979. These values indicate a slight disagreement about the assessment and review processes.

For upgrading employees' digital skills through new digital functions and applications, the responses corresponded to a relative agreement, since the mean reached 3.43 and the standard deviation 0.954. It shows a moderate positive effect on improving participants' digital skills, with moderate variability.

The assessment of the relationship of the development of digital skills with the level of education, by the participants, led to a relative agreement with the mean value equal to 3.44 and the standard deviation to 1.038.

Also, the participants reported that those in positions of responsibility were not preceded in training seminars on the development of digital skills. The mean reached just 2.51 and the standard deviation was 1.168. These values suggest that people in positions of responsibility were not preceded by educational seminars on the development of digital skills, according to the survey participants.

Table 1

*Necessary Digital Skills for the Effective Performance of Official Duties*

| What digital skills do you consider necessary to perform your duties more effectively?                                        | N  | %     |
|-------------------------------------------------------------------------------------------------------------------------------|----|-------|
| The ability to communicate and collaborate through electronic media                                                           | 82 | 39.8% |
| The ability to use software to create, edit and present information, such as word processors, spreadsheets, and presentations | 42 | 20.4% |
| The ability to analyze data and apply analytical thinking techniques to make decisions and improve performance                | 34 | 16.5% |
| The ability to search and utilize information on the Internet                                                                 | 28 | 13.6% |
| Safe use of the internet and dealing with cyber threats                                                                       | 6  | 2.9%  |
| Other                                                                                                                         | 2  | 1.0%  |
| All of the above                                                                                                              | 12 | 5.8%  |

Table 2

*Sample Descriptive Statistics*

| Variable                                                                                                                           | N   | Mean | Std. Deviation | Std. Error Mean |
|------------------------------------------------------------------------------------------------------------------------------------|-----|------|----------------|-----------------|
| Q1: To what extent are changes in the external environment and objectives taken into account when evaluating management processes? | 206 | 2.91 | 0.961          | 0.067           |
| Q2: To what extent are processes evaluated and reviewed based on their effectiveness?                                              | 206 | 2.57 | 0.979          | 0.068           |
| Q3: Do you feel that new digital features and apps have upgraded your digital skills?                                              | 206 | 3.43 | 0.954          | 0.066           |
| Q4: Do you think that the development of digital skills is related to your level of education?                                     | 206 | 3.44 | 1.038          | 0.072           |
| Q5: Have those in positions of responsibility attended training seminars on the development of digital skills?                     | 206 | 2.51 | 1.168          | 0.081           |

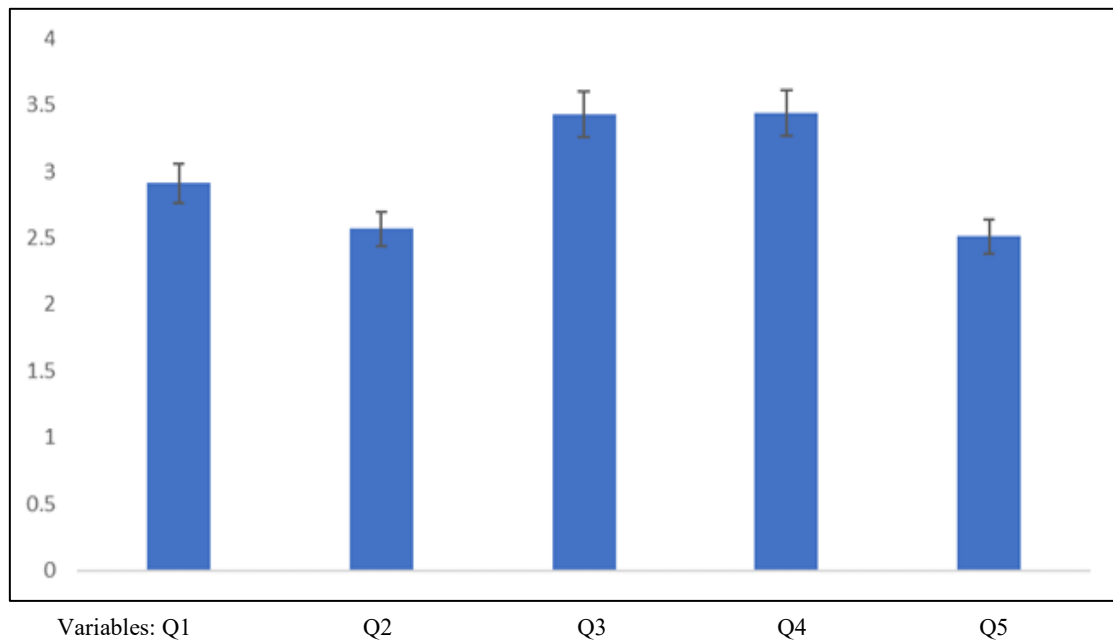


Figure 3. Administrative processes and skills development.

Finally, the participants were asked to state the main reasons that did not contribute to the development of their digital skills. Lack of time to attend relevant training was the main problem (40.3%), with lack of financial incentives (17%), development incentives (18.40%), and insufficient technological equipment (15%) coming in very close frequencies. No shortage was reported by 9.2% of participants.

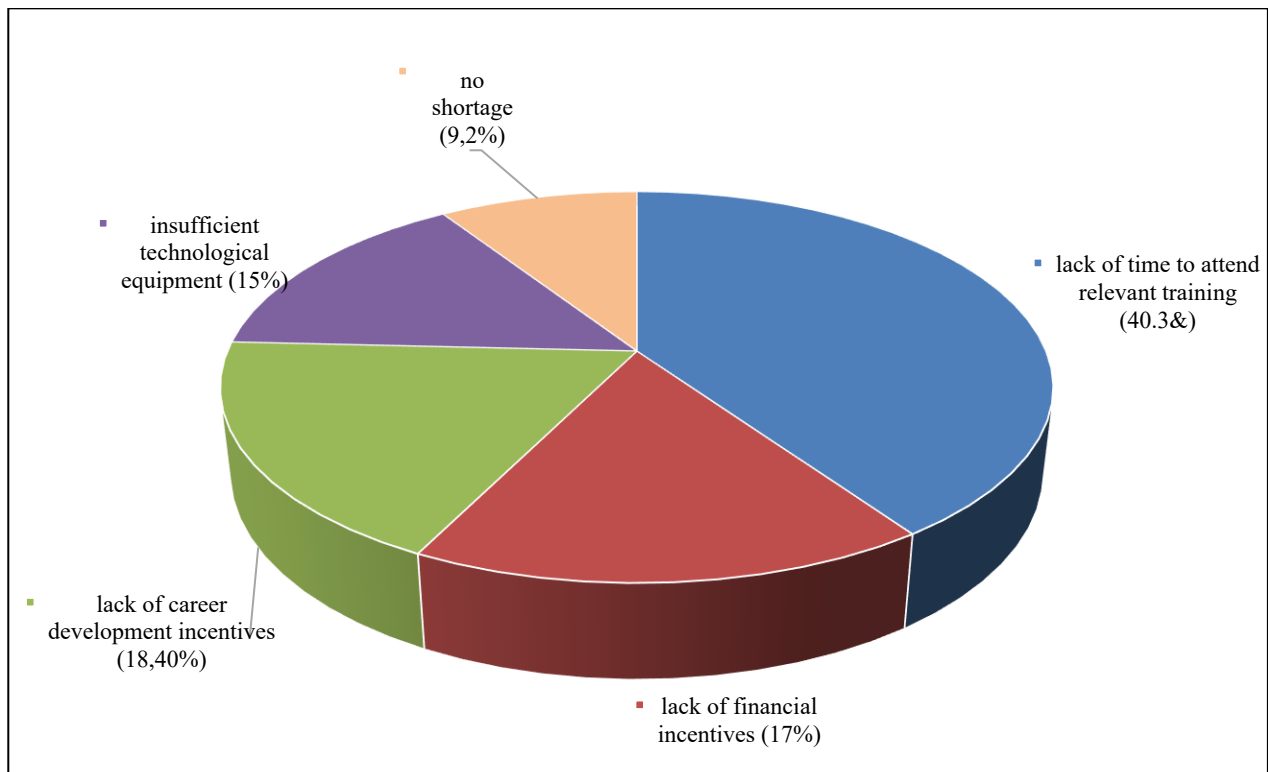


Figure 4. Important reasons that hindered the development of digital skills.

Parametric and non-parametric controls were used to derive the results, with a significance control level equal to 5%. The statistical tests used were the Student t-test and the Wilcoxon test, which allowed us to evaluate the significance of the results and to determine whether the alternative hypothesis is valid, which states that the value of the variable is greater than value (3) = moderate agreement.

At this point it is pointed out that in the survey, which concerns the role of Digital Transformation and Human Resources Management in the Peloponnese Region, and in the question on the subject: “Which digital skills do you consider to be necessary for the most effective performance of your duties”, it was asked of the employees to further specialize their views on more specialized skills in more specialized areas that due to professional expertise they are able to know better. Therefore, there was the following analysis in the following areas, from which important results emerge:

- Digital skills in Databases;
- Digital skills in Application Development—Web Services;
- Digital skills in Server Management;
- Digital Skills in Security;
- Digital skills in Network Management;
- Digital skills in Data Science;
- Digital skills in Artificial Intelligence;
- Digital skills in Geographical Systems.

**Database management.** Regarding digital database management skills, no statistically significant agreement appeared in any of the propositions. In relation to information/data management in relational databases (SQL), no statistically significant difference was observed between the observed preferences ( $p = 0.401$ ). The same in relation to the management of relational databases (MySQL, MS Server, Oracle, etc.) ( $p = 0.161$ ). In addition, in relation to NoSQL database management (MongoDB, etc.) and database management in a Cloud environment (Azure, etc.), statistically significant differences were observed ( $p = 0.001$ ), with employees not considering them significant skills (“No” = 75%).

**Application development.** Regarding the digital application development skills that employees consider necessary for the effective performance of their duties, there was mostly disagreement. Regarding the development of applications for Android & IOS devices and the development of web applications (Java, NodeJS, etc.), a statistically significant disagreement was observed for these skills (“No” = 90% and 84%,  $p = 0.000$ ), indicating that such duties do not concern the employees. Accordingly, Web Application Development, Web Services Development, and Knowledge Representation are not considered important skills for employees in IT departments ( $p = 0.000$ ).

Website development and management (Wordpress) and knowledge of the python language show no statistically significant agreement or disagreement ( $p = 0.262$  and  $p = 0.576$  respectively). In general, there is a clear negative response for the importance of application development knowledge and knowledge representation and not statistically significant, but strong disagreement about the importance of knowledge in web development and management and in python programming.

**Server management.** The digital server management skills that employees consider necessary show a variation. Regarding the management of LINUX servers, no statistically significant difference was observed between the observed preferences ( $p = 0.092$ ), but there is a significant majority of 635 who do not consider this

knowledge important. However, in the management of Windows servers, a statistically significant agreement was observed for this skill ( $p = 0.000$ ), revealing its importance and the use of such systems in the Peloponnese Region. On the contrary, regarding the management of servers in a Cloud environment (Azure, etc.), no statistically significant difference in preferences was observed ( $p = 0.161$ ), although there is disagreement (61%) with the necessity of this skill. Overall, a preference for knowledge about Windows servers rather than open technology systems, was revealed.

**Security and data protection.** In relation to the digital skills for security and data protection that employees consider necessary, a general agreement was presented. In relation to cyber security breaches, detection of vulnerabilities in web servers and security in a cloud environment, statistically significant agreements were observed ( $p < 0.05$ ), underscoring the importance of these skills for employees. In addition, the GDPR was found to be statistically significant ( $p < 0.05$ ), reinforcing the need to understand and implement these security standards. However, in terms of security awareness, no statistically significant difference was observed ( $p > 0.05$ ), indicating that this skill is not a priority of Peloponnese Region employees.

**Network management technologies.** Skills in network management technologies and Cisco routing and switching technologies, as well as network management in a Cloud environment were considered. Employees expressed a similar preference for these two skill categories ( $p > 0.05$ ), suggesting that there is no statistically significant difference between the preference for the specific skills. These results suggest that employees consider all three of these skills equally important to successfully fulfill their IT requirements.

**Use of data analysis software.** Regarding the skills of using data analysis software, which employees consider necessary, there was universal disagreement. Specifically, the research focused on the use of statistical analysis software, the R language for data analysis, applied machine learning with the Python language, and business intelligence, data analysis, and the use of business intelligence tools. For all these skills, workers expressed statistically significant disagreement, with  $p$ -values  $> 0.000$  in all cases, indicating strong statistical significance.

**Machine learning and artificial intelligence.** In the context of the present study, from the Binomial test of the digital skills that employees consider necessary, introductory knowledge in artificial intelligence and its applications was considered important by only 22%, while 78% answered negatively. Similar were the results for Machine Learning and Artificial Intelligence; only 24% recognized the importance of these skills, while the vast majority of 76% rejected the need for them. In both cases, Binomial tests statistically rejected the null hypothesis, making it clear that employees do not consider these skills necessary for their jobs ( $p$ -value  $< 0.05$ ).

**Use of CAD software.** Binomial test results for employees' digital skills versus knowledge of CAD software showed that the use of CAD software was the only digital skill for which a statistically significantly higher proportion of employees did not consider it necessary for the effective performance of their duties ( $p = 0.011$ ). On the contrary, the knowledge of Geographical Information Systems and the Spatial Analysis of Mosaics did not show statistically significant differences ( $p = 0.262$  and  $p = 0.161$  respectively), with the majority not considering them significant.

### **Results About Efficiency and Productivity**

With the second research question, it was studied whether the development of digital skills through the use of information and telecommunications technologies contributes to improving the efficiency and productivity of

the employees of the Peloponnese Region. There were four individual questions regarding the contribution of ICT but also the application of methods to measure the efficiency and productivity of employees:

Table 3

*ICT Contribution to Improving Efficiency and Productivity*

|                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Does the use of ICT and digital skills contribute to improving the efficiency and productivity of the employees of the Peloponnese Region?                   |
| To what extent does the use of ICT contribute to efficiency in improving the services provided to citizens—clients?                                          |
| To what extent the use and maintenance of technical equipment contributes to the realization of the goal of digital transformation to increase productivity? |
| To what extent are there indicators for evaluating the effectiveness of administrative procedures?                                                           |
| To what extent is the influence of internet and e-government applications on the effectiveness of administrative processes evaluated?                        |

The answers were given on a five-point scale with the value (3) representing moderate agreement.

In the following table of sample statistics, four variables related to the degree of agreement on whether the use of ICT contributes to improving the efficiency and productivity of employees were examined. The results for each question from the above are as follows:

Regarding the extent to which the use of ICT contributes to the improvement of services provided to citizens—customers, the mean value reached 4.26, indicating a high level of agreement. The standard deviation was 0.763, indicating moderate variability.

Similarly, for the variable that examined whether the use and maintenance of technical equipment contributes to the realization of the goal of digital transformation, the mean value reached 3.50, indicating a moderate level of agreement. The larger standard deviation of 1.016 indicates a greater degree of response variability compared to the previous variable.

The existence of indicators to evaluate the effectiveness of administrative procedures was rated low with a mean response value of 2.24, indicating a lower level of agreement between respondents. The relatively large standard deviation of 1.034 indicates a wide range of opinions and evaluations on this variable.

For the degree to which the influence of internet and e-government applications on processes is assessed, the mean value reached 2.93, indicating a moderate level of agreement. A standard deviation of 1.026 indicates considerable variation in responses.

Table 4

*Descriptive Statistics of Factors Contributing to Efficiency and Productivity*

| Variable (questions)                                                                                                                                             | N   | Mean | Std. Deviation | Std. Error Mean |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|------|----------------|-----------------|
| Q1: To what extent does the use of ICT contribute to efficiency in improving the services provided to citizens—clients?                                          | 206 | 4.26 | 0.763          | 0.053           |
| Q2: To what extent the use and maintenance of technical equipment contributes to the realization of the goal of digital transformation to increase productivity? | 206 | 3.50 | 1.016          | 0.071           |
| Q3: To what extent are there indicators for evaluating the effectiveness of administrative procedures?                                                           | 206 | 2.24 | 1.034          | 0.072           |
| Q4: To what extent is the influence of internet and e-government applications on the effectiveness of administrative processes evaluated?                        | 206 | 2.93 | 1.026          | 0.072           |

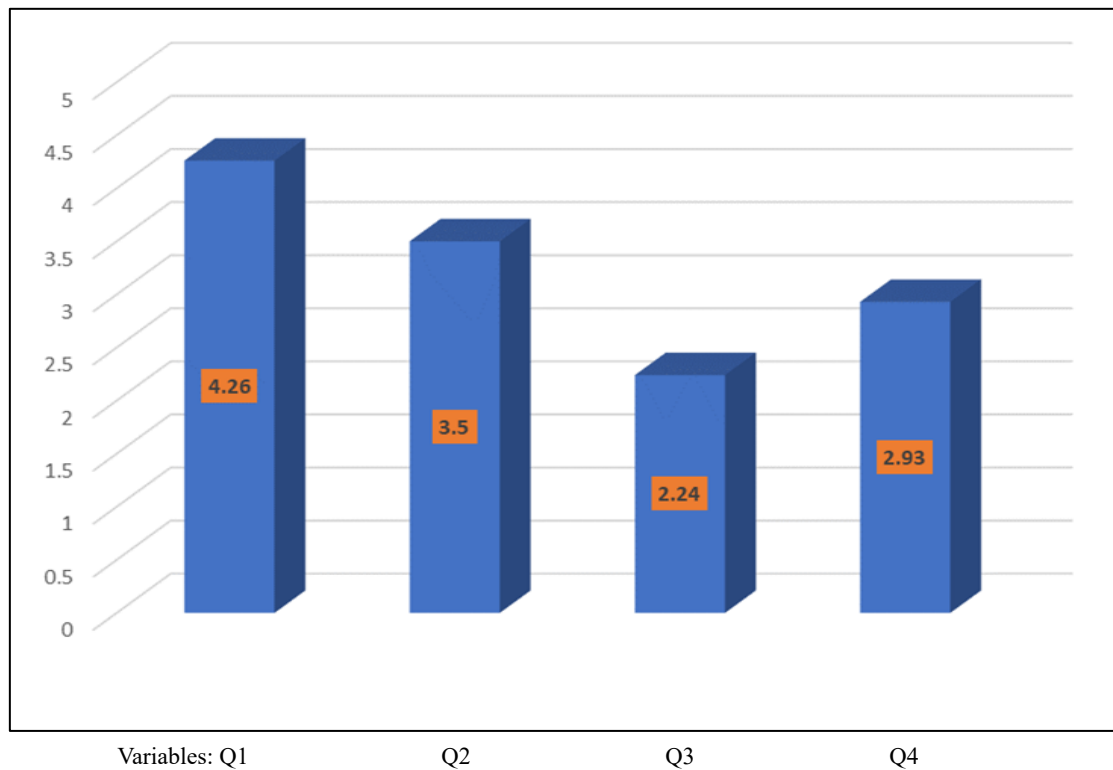


Figure 5. Impact of Information and Communication Technologies to efficiency and productivity improvement.

Parametric and non-parametric tests were used to derive the results of the research and draw conclusions as to whether the use of ICT contributes to improving efficiency and productivity. The null hypothesis refers to a value of the variable is less than or equal to [3] = moderate attitude, while the alternative hypothesis suggests that the value is greater than [3]. We used both the student's t-test and the Wilcoxon test to analyze the data, with a significance test level of  $\alpha = 5\%$ .

In relation to the degree to which the use of Information and Communication Technologies contributes to the improvement in terms of the efficiency of services provided to citizens—clients, a student statistic of 23.6486 and a p-value of  $8.59e^{-61}$  emerged, with 205 degrees of freedom. Similarly, the Wilcoxon statistic reached 16,726 with an extremely low p-value of  $4.54e^{-32}$ . These results provide strong evidence to reject the null hypothesis and support the alternative, that employees in the Peloponnese Region believe that the use of ICT significantly contributes to the improvement of services provided to citizens and customers (mean value 4.26).

Regarding the degree to which the use and maintenance of technical equipment contributes to the realization of the goal of digital transformation to increase productivity, the student test resulted in a statistic of 7.0652 and a p-value of  $1.23e^{-11}$ , while the Wilcoxon resulted in statistic 9,327.5 and p-value  $2.29e^{-10}$ . Findings indicate agreement on the relationship between the use and maintenance of technical equipment and the achievement of digital transformation goals (mean value 3.50).

The existence of indicators to evaluate the effectiveness of administrative procedures showed the opposite result. The t statistic reached -10.575 with a p-value of 1, while the Wilcoxon statistic was 704, with a p-value of 1e as well. High p-values do not provide sufficient evidence to reject the null hypothesis. Therefore, they

suggest that there is no substantial evidence to support the claim that there are indicators to assess the effectiveness of administrative processes (mean value 2.24).

Finally, the variable for the degree to which the influence of internet and e-government applications on the efficiency of the district's administrative procedures is evaluated resulted in a t statistic of -1.0184 with a p-value of 0.8451 and Wilcoxon statistic 4,122 with a p-value of 0.8941, leading to a failure to reject the null hypothesis, which suggests that the assessment of the influence of internet applications and e-government on the processes is not applicable, according to with the employees of the Peloponnese Region (mean value 2.93).

Table 5

*Inductive Controls*

| One sample t-test and Wilcoxon                                                                                                                               |          |           |     |                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----------|-----|----------------------|
| Variable (questions)                                                                                                                                         | Test     | Statistic | df  | p-value              |
| To what extent does the use of ICT contribute to efficiency in improving the services provided to citizens—clients?                                          | Student  | 23.6486   | 205 | 8.59e <sup>-61</sup> |
|                                                                                                                                                              | Wilcoxon | 16,726    |     | 4.54e <sup>-32</sup> |
| To what extent the use and maintenance of technical equipment contributes to the realization of the goal of digital transformation to increase productivity? | Student  | 7.0652    | 205 | 1.23e <sup>-11</sup> |
|                                                                                                                                                              | Wilcoxon | 9,327.5   |     | 2.29e <sup>-10</sup> |
| To what extent are there indicators for evaluating the effectiveness of administrative procedures?                                                           | Student  | -10.575   | 205 | 1                    |
|                                                                                                                                                              | Wilcoxon | 704       |     | 1                    |
| To what extent is the influence of internet and e-government applications on the effectiveness of administrative processes evaluated?                        | Student  | -1.0184   | 205 | 0.8451               |
|                                                                                                                                                              | Wilcoxon | 4,122     |     | 0.8941               |

Regarding the main advantages created using ICT, the improvement of organization (28.20%) was the most important advantage, according to the research participants. Better working conditions (20.49%) and arrangements (20.00%) are also considered very important. Improving skills reached 16.07% of responses with the remaining suggestions having frequencies below 10%.

Table 6

*Main Advantages Created by the Use of ICT*

| ICT advantages                        | N   | %      |
|---------------------------------------|-----|--------|
| Improved work organization            | 172 | 28.20% |
| Improved working conditions           | 125 | 20.49% |
| Better working time settings          | 122 | 20.00% |
| Improved skills and qualifications    | 98  | 16.07% |
| Improved health and safety conditions | 38  | 6.23%  |
| Improved work-life balance            | 52  | 8.52%  |
| None of the above                     | 3   | 0.49%  |

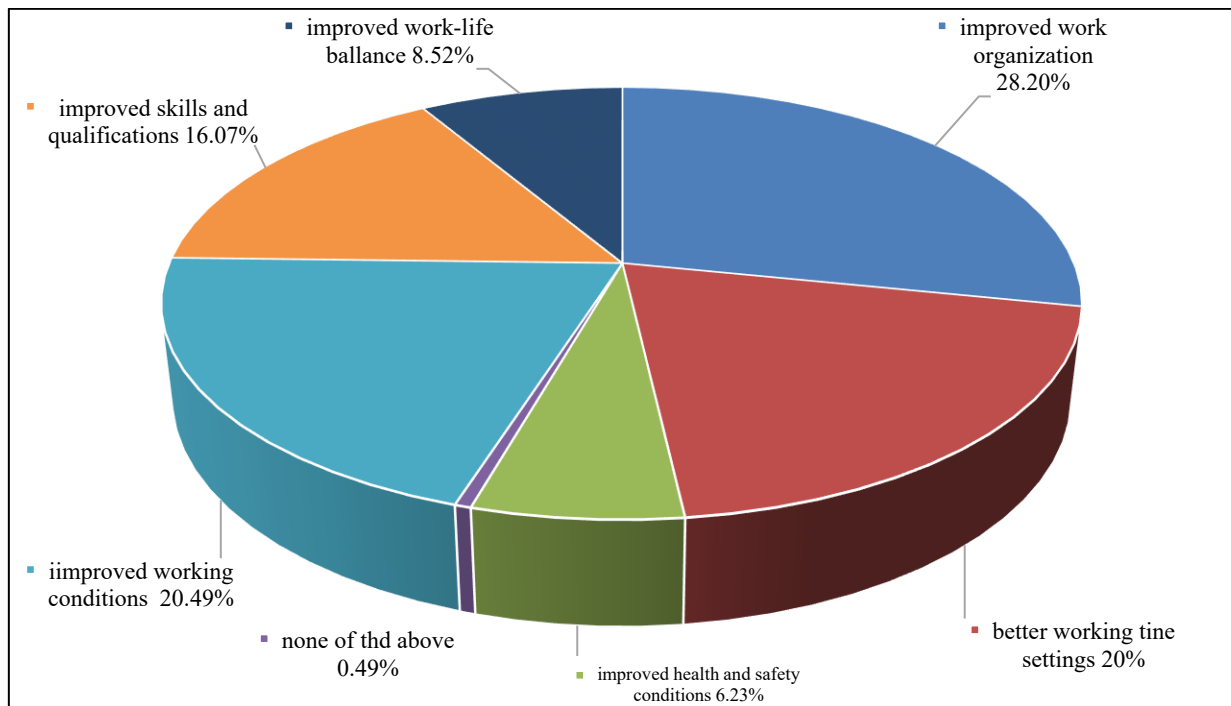


Figure 6. Advantages of using ICT.

## Discussion

This study presents the results of a research that examines the importance given by the employees of the Peloponnese Region to various digital skills in the performance of their duties, as well as the contribution of the use of e-government technologies to improving the efficiency and productivity of employees of the Region of Peloponnese.

In general, a high percentage is observed in the ability to communicate and collaborate via electronic media, underscoring the importance of online communication in the modern environment of public administration. They are followed by the ability to use word processing and presentation software and data analysis, while the percentage for using the internet safely is the lowest. The percentage choosing all digital skills is also interesting, suggesting an integrated approach.

Conversely, more specialized knowledge is not characterized as important. Opinions about data analysis skills were more balanced, confirming their importance over those who answered negatively.

Similarly, when it comes to database management, only a smaller percentage consider SQL database skills to be important. Most of the participants do not consider this knowledge to be critical for the job. Opinions were similarly divided on relational databases such as MySQL and OracleDB. An even smaller percentage considered NoSQL database management important. Lower percentages of agreement also existed in relation to knowledge of CAD and GIS software.

Overall, respondents considered searching/using online information, online communication/collaboration, and using software tools as critical. However, there were differing views on the need for database management expertise.

The findings show that basic digital skills and knowledge of office applications are an integral part of staff jobs. However, the research also revealed the need to specialize certain roles in modern data technologies.

Also, in the present research, studying the impact of e-government on improving employee efficiency and productivity in the Peloponnese Region, employees responded at levels of strong agreement. On the contrary, there was disagreement about the existence of indicators for the evaluation of the efficiency of administrative procedures and a moderate attitude about the effect of internet and e-government applications on administrative procedures.

In conclusion, it must be emphasized that employees recognize the importance of ICT in efficiency and productivity but emphasize the lack of monitoring of results.

The present study captures the given situation and determines the level of administrative function. From the responses of the employees, data was obtained that most of them confirm what the literature review revealed. The examined sample consists of 206 employees from all the Regional Units of the Peloponnese. It would be interesting to expand the research to the other Greek Regions so that the results can be compared and analyzed further.

It is considered necessary to investigate the views of the employees at a later point in time to strengthen the theoretical argumentation of the present study. In addition, future research into the degree of employee satisfaction with the organization's leadership and its planning and strategy, based on the research objects, would be appropriate.

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