TOWARDS A SUSTAINABLE DIGITAL TRANSFORMATION: THE ROLE OF HUMAN RESOURCES IN PUBLIC ADMINISTRATION AND CITIZEN SATISFACTION. THE CASE OF THE MUNICIPALITY OF KILLELER.

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Abstract
Digital transformation has highlighted its importance as a catalyst for the modernization of public sector structures and functions, offering opportunities for improving efficiency, transparency and the citizen experience. This paper, entitled: "Towards a Sustainable Digital Transformation: The Role of Human Resources in Public Administration and Citizen Satisfaction. The Case of the Municipality of Kileler", explores the critical role of human resources as agents of change in a sustainable digital reform. At the same time, the impact of human dynamics on citizen satisfaction is examined, with an emphasis on the Municipal Authority of Kileler as a case study.

A total of 186 questionnaires were collected from residents of the Municipality of Killeler and statistical analysis using SPSS 29.0 showed that the reliability of the analysis is excellent, with a Cronbach's alpha coefficient (α=0.897). Through the quantitative and statistical analysis of the questionnaires, four (4) research questions were examined, which gave us useful results such as: (a) Digital transformation is the key to improving the efficiency of human resources and the quality of services in the Municipality of Kileler, while contributing to the creation of a sustainable administration system. (b) Digital applications, such as electronic protocols and automated application management, have significantly reduced bureaucratic procedures, the response time to citizens' requests and the environmental footprint of the administration. (c) Human resources have satisfactorily faced the challenges of adapting to new technologies, but, through appropriate education and training, can respond even more to the new requirements, implementing a more effective, transparent and sustainable administration model, which will meet the needs and expectations of citizens.

Key words: *Digital transformation, Public administration, Sustainability, Human resources, Municipality of Kileler.*

Introduction

Digital transformation has emerged as a key factor in modernizing public sector structures and operations. According to the Organization for Economic Cooperation and Development

(OECD, 2014), the integration of digital technologies not only improves efficiency and transparency, but also enhances the citizen experience, creating a more participatory public sector.

Definition and Elements of Digital Transformation

Digital transformation has emerged as a key factor in the modernization of public sector structures and functions and has been the subject of numerous formulations and interpretations, both in the broader social and business field, and in the public sector in particular. Digital transformation is a complex process that involves the integration of digital technologies into the business processes and structure of organizations. It refers to the strategic integration of digital technologies into all aspects of an organization or business. It includes the adoption of technologies such as cloud computing, big data, artificial intelligence (AI) and the Internet of Things (IoT), with the aim of improving efficiency, flexibility and the experience of citizens or customers (Westerman, Bonnet, & McAfee, 2014). In the context of public administration, digital transformation involves the use of digital technologies to improve transparency, efficiency and interaction with citizens. The aim is to upgrade traditional processes and create new, more flexible and efficient approaches to the provision of public services (OECD, 2014).

The European Commission's Directorate-General for Research and Technological Development (DG RDT, 2013) also emphasizes that digital transformation involves new methods of dealing with citizens, the creation of innovative service delivery frameworks, and new relationships between citizens and public organizations. This process requires changes in infrastructure, culture and skills, which contribute to efficiency and participation. The success of digital transformation in the public sector depends on the understanding and adoption of innovations, which are not limited to technology alone, but include the overall reorganization of organizational structures and strategies.

Recent studies, such as that of Mergel et al. (2019), highlight digital transformation as a complete reorganization of public sector processes and services, going beyond the simple digitization of existing functions. In other words, it incorporates the need to cultivate skills that facilitate the understanding and application of new technologies (Karanatsios&Bouga, 2021). Innovation in this context acts as a catalyst for improving daily life and solving complex social issues.

Key Drivers and Technological Trends

The success of digital transformation depends on enhancing communication and collaboration between public organizations. The use of unified information systems and data interconnection allow for more efficient information management and informed decision-making (Janssen & van der Voort, 2016). In addition, digital platforms and social networks provide new tools for citizen participation in decision-making processes, thereby enhancing transparency and democratic governance.

Rapid progress in digital technologies, combined with the growing need for efficient and transparent governance, necessitate the adoption of modern strategies. These strategies focus on the use of cutting-edge technologies to improve the delivery of public services and solve everyday problems for citizens (Sandhu, 2021).

The Role of Human Resources

The success of digital transformation in the public sector depends largely on the contribution of human resources. Human resources are a determining factor for the success of digital transformation. Employees are the agents of change, as the effective integration of technologies requires knowledge, skills and adaptability in technological and managerial operations, which are key to the transition to sustainable digital operation. According to Kane et al. (2015), the development of technological and leadership skills in employees is a basic prerequisite for the transition to sustainable digital governance.

Targeted education and continuous training of human resources is crucial. Creating an environment that promotes innovation and encourages inclusion enhances the acceptance and success of new technologies (Tzamaloukas, 2021). At the same time, leadership plays a crucial role, as the commitment and vision of management executives are catalysts for the adoption of digital transformation strategies. The human dynamic in this context, the participation of human resources in the decision-making process offers trust and increases inclusiveness.Leadership commitment and the creation of a favorable environment that encourages innovation and collaboration are vital. By adopting good practices from other government models, the public sector can and must adapt to the rapid changes of technological developments.

Citizens and Satisfaction

Citizen satisfaction is a key indicator for assessing the success of digital transformation. Citizens expect services that are fast, efficient, easily accessible and, of course, meet their expectations, while at the same time fulfilling to a high degree the feeling of transparency and immediacy. According to Janssen and van der Voort (2016), the use of integrated information systems and digital platforms can improve the citizen experience, strengthening their trust in public administration.Citizen participation in decision-making processes is equally important. Initiatives that incorporate citizens' views and needs enhance transparency and democratic governance (Sandhu, 2021). Furthermore, the use of tools, such as e-government applications, allows citizens to have direct access to information and services, promoting their active participation.

Holistic Approach and Need for Cultural Change

Digital transformation requires a comprehensive review of organizational structures, corporate culture and business models. Leadership commitment, adaptability and innovation are critical factors for its success (Kane et al., 2015). Beyond technological change, digital transformation entails the reorganization of relations between citizens and public services, encouraging the active participation of human resources in the exploitation of new technologies, as a result of the acquisition of important skills and competencies, on the part of human resources (Tzamaloukas, 2021).

Digital Innovation in Greek Public Administration

In Greek public administration, digital innovation is a key driver for the modernization and reform of public services. Digital transformation initiatives have intensified, especially through the adoption of advanced technologies and the exploitation of the potential of the digital age. These efforts offer significant opportunities, both for improving efficiency and transparency, and for citizen participation in public affairs (Deloitte & SEV, 2022).

The case of the Municipality of Killeler

This research focuses on the importance of digital transformation and the role of human resources for a sustainable and effective public administration. With an emphasis on citizen satisfaction, the paper examines the implementation framework in the Municipal Authority of Killeler, highlighting the challenges and opportunities for harnessing the potential of digital transformation.

Digital transformation allows for the simplification of procedures and the faster provision of services, such as the ability to serve online and direct information. Digital services become more accessible and flexible, allowing citizens to interact with local authorities, without restrictions in time and place (Gil-Garcia et al., 2020; Tsiavos et al., 2023).

The Municipal Authority of Killeler is a typical example of the implementation of sustainable digital transformation strategies. The study of this case reveals the importance of the commitment of local leadership and the adaptability of human resources to technological changes(Bousios et al., 2021). The adoption of innovative solutions by the Municipal Authority aims to reduce bureaucracy, improve efficiency and enhance citizen satisfaction.The strategic approach of the Municipal Authority includes the integration of digital tools for service management, promoting transparency and strengthening collaboration with citizens. These initiatives highlight the potential of local authorities to act as pioneers of digital transformation, in a sustainable public sector.

Digital transformation in local government does not depend only on technology and infrastructure, but also on human resources, which is recorded as the most important form of intangible capital (Giannouklidis, 2015). The human factor is the one who, through the production of innovative ideas and the utilization of knowledge and capabilities in finding solutions, provides added value and multiplies productivity

Human resources have a crucial role in the successful implementation and management of digital initiatives, since as mentioned, the successful implementation of ICT depends mainly on the availability of potential to possess the relevant ICT knowledge and skills (IOBE, 2014).

In conclusion, we state that digital transformation constitutes a multidimensional strategy that extends beyond the adoption of new technologies. It requires changes in organizational structures, business processes and culture, while focusing on improving the citizen experience, efficiency and transparency. Despite the challenges, the opportunities it offers are crucial for the evolution of public services and the creation of a more efficient and participatory governance (Gil-Garcia & Pardo, 2005; Nam&Pardo, 2011; Fung, 2015). Undoubtedly, the success of digital transformation in practice depends on leadership commitment, as well as the ability to adapt and innovate (Kane et al., 2015).

1. Aim of the Research

The main purpose of this study is to investigate the digital transformation in public administration, with an emphasis on the role of human resources in citizen satisfaction, through the case study of the Municipality of Killeler. The study will focus on the efforts to digitize the Municipality's services and examine how these efforts affect citizen satisfaction with the services provided, with the contribution of well-trained human resources and the improvement of electronic and building infrastructure. The analysis of the results will confirm

the relationship between digital technology and the quality of the services provided. The study also aims to provide valuable conclusions and directions for the future improvement of public services, promoting a more efficient and transparent sustainable administration model, which will meet the needs and expectations of citizens.

2. MethodologyoftheResearch

In this paper, the quantitative research method was used, as it is considered the most appropriate for our research objectives. By incorporating modern tools and adapting to current trends, quantitative research can provide accurate and valid results for the investigation of social phenomena (Sukamolson, 2007), as well as allowing the examination of correlations between variables and is suitable for the investigation of opinions and perceptions (Robson, 2010; Marinopoulos, 2021).

The research part includes statistical analysis with questionnaires, that is, a quantitative analysis carried out with the main aim of recording the participants' agreement or disagreement with a number of statements related to each research question.

A total of 186 questionnaires without incomplete responses were collected through the google forms application, as well as in person, which constitute the research sample. The participants in the survey answered the questions included in the questionnaire, after observing the ethical principles, that is, the voluntary nature of participation and also the respect of their anonymity were made known. The participants expressed their opinions by completing the questionnaire, during the period from August 10 to September 10, 2024. The questionnaire included questions on a five-point scale (Likert), which examines the degree of agreement or disagreement on certain issues related to the survey.

The research questions that the participants in the survey were asked to answer are the following:

1. How does digital transformation affect public administration?
2. What is the role of human resources in Digital Transformation?
3. How can digital transformation improve citizen satisfaction?
4. What is the current state of digital infrastructure and services provided in the Municipality of Killeler?

Descriptive statistics and correlation analysis were applied to conduct the statistical analysis of the data. The data analysis was implemented using the SPSS 29.0 statistical package and resulted in the production of diagrams and results derived from the participants' responses to the questionnaire questions.

3. Results

3.1 Quantitativeanalysis

No missing measurements were observed in either the demographic data or the main part of the quantitative analysis. The demographic data analyzed consisted of gender, age, educational level, professional status, and marital status.

3.1.1 Cronbach's α coefficient

One of the main indicators for assessing the reliability of a questionnaire is the Cronbach's alpha coefficient (Cronbach, 1984).

The reliability of the analysis was considered excellent, because the Cronbach's coefficient approaches unity to a very high degree (α=0.897). Also, the highest reliability appeared in the questions "digital transformation contributes to the reduction of bureaucracy in public administration" of the 1st research question and "the human resources of the Municipality of Killeler respond adequately and directly to the requests of its citizens", of the 4th research question (α=0.899).

Regarding the analysis of the reliability of the research questions, the 2nd research question presented the highest, where it proved to be excellent, since the Cronbach's coefficient approaches unity to a very high degree (α=0.893).

• Then, the highest reliability was presented by the 3rd research question (α=0.885).
• Then the 4th research question (α=0.817) and finally,
• the 1st research question with (α=0.812).

3.2 The profile of the citizens (Municipality of Kileler)

A total of 186 residents of the Municipality of Kileler participated in the survey, distributed as follows: 54.8% men and 45.2% women (Figure 1).

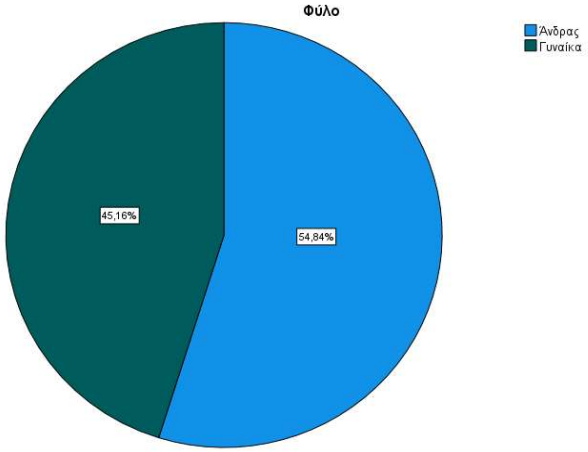

Figure 2: Distribution of participants by gender.

3.3 Age of the participants (Municipality of Kileler)

Regarding the age of the participants, the dominant group consisted of individuals aged 31-40 years, constituting 31.7% of the total cohort, followed by the 51-60 year old group with a percentage of 20.4%, the 41-50 group with a percentage of 16.7%, the over 60 group with a percentage of 14.5%, followed by the 21-30 group with a percentage of 13.4%, while participants under 20 years of age represented only 3.2% of the total sample of participants (Table 1).

Table 1: Demographic Data – Age

Age of participants

		Frequency	Percent	ValidPercent	CumulativePercent
Valid	<20	6	3,2	3,2	3,2
	21-30	25	13,4	13,4	16,7
	31-40	59	31,7	31,7	48,4
	41-50	31	16,7	16,7	65,1
	51-60	38	20,4	20,4	85,5
	>60	27	14,5	14,5	100,0
	Total	186	100,0	100,0	

3.4 Level of education

Regarding educational level, the majority of the study participants were high school graduates, constituting 39.2% of the total sample. In addition, 33.9% of the participants were university graduates, 15.6% had postgraduate studies, 7% had completed high school and finally 4.3% had completed primary school (Table 2).

Table 2: Demographic Data – Level of education

Level of education

		Frequency	Percent	ValidPercent	CumulativePercent
Valid	Primaryschool	8	4,3	4,3	4,3
	Middle School	13	7,0	7,0	11,3
	High school	73	39,2	39,2	50,5
	University	63	33,9	33,9	84,4
	Master'sdegree	29	15,6	15,6	100,0
	Total	186	100,0	100,0	

3.5 Professional status of participants

Regarding professional status, most participants in the survey declared themselves farmers/livestock breeders, at a rate of 30.1%, followed by private and public employees at rates of 20.4% and 19.9%, respectively (Table 3).

Table 3: Demographic Data – Professional status

Professional status

		Frequency	Percent	ValidPercent	CumulativePercent
Valid	Civil servant	37	19,9	19,9	19,9
	PrivateEmployee	38	20,4	20,4	40,3
	Freelancer	35	18,8	18,8	59,1
	Farmer / LivestockFarmer	56	30,1	30,1	89,2
	Worker	20	10,8	10,8	100,0
	Total	186	100,0	100,0	

3.6 Maritalstatusofparticipants

Regarding marital status, the majority of participants were married at 62.9%, while as single, a percentage of 33.3% was reported and another percentage, referred to as "Other", was reported at a percentage of 3.8% (Table 4).

Table 4: Demographic Data – Marital status

Marital status

		Frequency	Percent	ValidPercent	CumulativePercent
Valid	Married	117	62,9	62,9	62,9
	Unmarried	62	33,3	33,3	96,2
	Other	7	3,8	3,8	100,0
	Total	186	100,0	100,0	

3.7. Correlations of variables

3.7.1 The 'Pearson' criterion

Regarding the correlations of the variables, the 'Pearson' criterion was applied, where it was shown that the questions under study are independent of both gender and educational level.
More specifically:

- "The improvement of the efficiency of both the procedures due to the application of digital transformation technologies in public administration", and the
- "Services provided to citizens, due to the adoption of new technologies by the potential in public administration", proved to be independent of gender and age, because the condition $p>0.05$ applies.

Accordingly:

- "The successful implementation of digital transformation, through teamwork and the active participation of employees with appropriate leadership", as well as

- "The requirement of investments for the digital transformation of the services of the Municipality of Kileler",proved to be independent of gender and age, as long as the condition p>0.05 applies.

Essentially, the responses of men or women or participants belonging to the same category of educational level are not identical, therefore they express ***different opinions***.

3.8. Effect of demographic/individual characteristics on the questionnaire variable.

3.8.1. ANOVA analysis

ANOVA analysis is applied to test if there is a significant difference between the variables, at a significance level of 5%.

In particular, it was demonstrated through the analysis of variance (ANOVA) regarding the research questions that:

- ***age*** is a significant factor only for the variable:
  - "Digital transformation contributes to citizens' satisfaction and trust in public services" of the 3rd research question (F= 2.540, p = 0.03).
- Correspondingly, the **educational level** was a significant factor for the variables:
  - "Online access to public administration services improves the response to citizens' needs" (F= 3.546, p = 0.008) and
  - "Digital transformation in public administration accelerates the progress and development of society" of the 3rd research question (F= 2.465, p = 0.047).
- Furthermore, with regard to ***family status***, it was shown to be a significant factor for the variable:
  - "The development of digital services aimed at satisfying the needs of citizens-users, makes it possible to reduce costs in the long term" of the 3rd research question (F= 4.403, p = 0.014).
- On the other hand, ***professional status***was not characterized as a significant influencing factor for any variable of all research questions.

3.8.2. T-test analysis

Through the application of the T-test method, it was shown that:

- gender was not a significant factor of influence for any of the variables of the 1st and 2nd research questions.
- On the contrary, gender was a significant factor for the variables:
  - "Online access to public administration services improves the response to citizens' needs" (t= -1.862, df=184, p = .031), and
  - "Digital transformation in public administration accelerates the progress and development of society" (t= -1.962, df=184, p = .012), of the 3rd research question.

- In particular, women had a higher level of perception regarding:
  - "The improvement in responding to citizens' needs, through online access to public administration services" (M.O.= 3.98, SD = 0.821), compared to men (M.O.= 3.74, SD = 0.922).Similarly, for

- "The acceleration of progress and development of society, due to the implementation of digital transformation in public administration" (M.O.= 3.45, SD = 0.870), compared to men (M.O.= 3.16, SD = 1.132).

➢ Furthermore, gender was characterized as a significant factor for the variable:
- "Online access to the services of the Municipality of Kileler is easy and efficient" (t= -1.758, df=184, p = .008) of the 4th research question.

➢ In particular, women had a higher level of perception regarding the ease and efficiency of online access to the services of the Municipality of Kileler (M.O.= 2.96, SD = 0.811), compared to men (M.O.= 2.76, SD = 0.719).

4. Conclusions - Proposals

The research focuses on the digital transformation of local government with an emphasis on the Municipality of Killeler. The research questions focused on:
1. The influence of digital transformation (D.T.) on public administration(1st),
2. The role of human resources in D.T. (2nd),
3. The ability of D.T. to improve citizen satisfaction (3rd),
4. The current state of digital infrastructure and services provided in the Municipality of Killeler (4th).

As for the majority of the participants in the research, they agreed:
- with most of the questions in the 1st research question and
- with all of the 2ndand 3rd.
- On the contrary, in the 4th research question, most participants expressed their neutrality with most of the questions.

Specifically, in the 1st research question, the majority of the survey participants answered that they agree with certain questions that compose it, such as:
- "by imposing the restructuring of administrative services" (48.4%), due to the implementation of digital transformation. This specific finding is identical to the corresponding one (Janssen, Charalabidis, &Zuiderwijk, 2012), which states that the simplification and automation of bureaucratic procedures through the use of digital tools is able to reduce the time and cost of administrative management.

Accordingly, most agreed:
- "with the improvement of the efficiency of procedures, by the application of technologies" (53.2%), as well as
- "of providing solutions to citizens' problems" (45.7%), which is in line with research (West, 2004), which states that the adoption of technologies such as electronic signature and identification through biometric data can improve the security and usability of digital services.

➢ At the same time, regarding the 2ndresearch question "the role of human resources in digital transformation", the majority of participants have agreed on all questions, such as:
- With the degree of success of digital transformation, due to the training in digital skills of the workforce and citizens (50%), or

On the contrary, with the lack of digital skills (32.8%), as an obstacle to digital transformation.

The above finding is identical to the study (Brynjolfsson& McAfee, 2014), which states that the continuous training and development of the digital skills of human resources is crucial for the successful implementation of digital transformation.

- Additionally, regarding the 3rdresearch question "ability of digital transformation to improve citizen satisfaction", most of the participants answered that they agree with all the questions, such as:
  - Trust in the security and protection of personal data by public services (33.9%).
    The above finding is identical to the study (Bertot, Jaeger, & Grimes, 2010), where the adoption of digital tools that promote transparency, such as online platforms for data publication and decision-making control systems, can enhance citizens' trust in public administration.
- Accordingly, the majority agreed that:
  Digital transformation can be achieved through teamwork with the active participation of employees with appropriate leadership (41.4%).
  This specific finding is identical to the research (Kane et al., 2015), which states that the leadership of the public administration must understand the situation and promote in every way the values of transparency, cooperation and continuous improvement.
- Finally, regarding the 4thresearch question "the current state of digital infrastructure and services provided in the Municipality of Killeler",

the majority declared its neutrality regarding:

- The support of digital transformation, from its infrastructure (37.6%), but also
- The improvement of the quality of services provided to citizens, due to its implementation (40.3%).

- However, they declared that they strongly agree regarding:
  - The requirement of investments for the digital transformation of its services (45.2%).
    This finding stems from the requirement to ensure adequate funding and resources for the implementation of digital initiatives (Davenport & Harris, 2005).
- On the other hand, the majority disagreed:
  - With the numerical adequacy of the potential of the Municipality of Kileler, for the immediate and effective satisfaction of its citizens (37.1%). The finding is consistent with the limited financial resources and the insufficient funding of digital actions (Tsikrika, 2022).

Regarding reliability, it is worth emphasizing that the reliability of the analysis was considered excellent, because the Cronbach's a coefficient approaches unity to a very high degree (a=0.897).

- *Some indicative proposals* that will be focused on the Municipality of Killeler are summarized below:

1. *Strengthening digital infrastructure*
   - Large-scale investments, aimed at upgrading IT networks and servers, in order to ensure the smooth operation of digital services.
   - Development and implementation of cloud computing systems, to improve data storage and management.

2. *Development of digital services for citizens*

- Creation of a single digital portal to expand the electronic services offered to citizens, such as issuing certificates, paying fees and submitting applications.
- Promotion of transparency, by providing access to open data on the activities of the municipality and its expenditures.

3. *Education and training of staff*
   - Organization of regular training programs and seminars to develop the digital skills of all employees.
   - Providing incentives for continuous training and professional development of staff.
4. *Promoting participation and collaboration*
   - Encouraging the active participation of employees in decision-making and the development of new digital initiatives.
   - Promoting collaboration between the various departments of the municipality, for the implementation of digital projects.
5. *Utilizing Information and Communication Technologies (ICT)*
   - Developing mobile applications that facilitate citizens' communication with the municipality and reporting problems.
   - Using geographic information systems (GIS) to improve the management of municipal infrastructure and services.
6. *Change management and communication*
   - Developing a change management strategy that includes clear communication of the objectives and benefits arising from the digital transformation.
   - Providing support and ongoing guidance to employees during the transition to new technologies and practices.

At the same time, there are some limitations in the research, such as the non-uniformity of the questions in the research questions.

Furthermore, another limitation is that the research concerns exclusively one Municipality (Kileler), so it is not possible to conduct a comparative study in relation to other Municipalities of the local government and / or abroad.Therefore, a future study would be good to include a larger sample of participants from various Municipalities in Greece, in order to be more reliable. In addition, future research may include a sample of participants from abroad, in order to determine differences or similarities, among the research questions under study.

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