

Digital Transformation of Public Administration: Myth or Reality? Case of County of Istria.

Abstract

Background: The rise of new digital technologies has sparked a continuing digital revolution that is significantly affecting the state and the institutions responsible for meeting the needs of its citizens. As a result, the government faces distinctive challenges and mounting pressure to devise innovative solutions.

Purpose—This research examines how digital transformation affects the work environment of digital technology users (DTU) in the public administration of Istria County, Croatia.

Design— A qualitative approach was used to conduct in-depth interviews with DTUs in cities and municipalities within the County of Istria. Additionally, secondary documentary data was utilised to gain deeper insights into the digital transformation of public administration within the Republic of Croatia.

Findings – The research shows that public administration DTUs believe digital technology has improved their working conditions and output. Digital transformation makes data more accessible, simplifies decision-making processes, and speeds up citizen service delivery. Respondents highlighted the obstacles and challenges that have not been overcome.

The originality of the research—The study presents DTU's perception of digital transformation in their work environment in the County of Istria. It provides a deeper understanding of the topic and opens a new insight through a qualitative approach.

Keywords: *digital transformation, digital technology user (DTU), Istria, public administration, qualitative analysis, grounded theory.*

1. Introduction

The digital revolution is a pivotal moment in human history, marked by an exponential increase in the speed and capacity of digital data storage, processing, retrieval, and communication (Imamov & Semenikhina, 2021). This technological progress has expanded and strengthened our cognitive abilities, which has created new opportunities for work and living (Korte, 2020). It has revolutionised industries, cities, communities, and individual lives, providing global communication networks and flexible machines at low cost and high speed. Such conditions are essential for a radical shift in the industrial modernity of the past (Lugavić & Strize, 2022).

Digital transformation is a widely discussed topic in business circles today. However, its implementation and research in the context of public administration, particularly at the local level, still need to be improved and understood (Vogl et al., 2020). Despite the significant impact of digital technologies on

various social activities, the literature on public administration requires a clearer understanding of digital transformation, leading to a vague grasp of its potential benefits for local communities (Gray & Rumpe, 2017; Lugavić & Azapagić, 2020; Perić, 2021).

The topic of digital transformation in business is frequently discussed in various circles. However, its relevance to public administration, particularly at the local level, must be more understood and adequately researched. Despite the profound impact of digital technologies on social activities, the concept of digital transformation needs to be clarified in the literature related to public administration, leading to a limited understanding of its scope and potential benefits for local communities (Irani et al., 2023).

It is expected to replace digital transformation with the digitalisation of existing business models or implement information and communication technologies like CRM and ERP¹ (Krizanic, Sestan-j-Peric & Tomicic-Pupek, 2019). However, it is essential to recognise that the digital transformation of companies, cities, and local communities goes beyond simply adopting digital tools individually. It involves creating a new innovative business and organisational model, effectively utilising it, and completely reorganising it (Wessel et al., 2020; Lugavić & Rožajac, 2022).

There is not enough adequate data on the state of digital transformation in Croatian cities and municipalities, as well as at the national level (Profiroiu, Negoită, & Costea, 2024) to provide a particular objective picture of the actual situation at any level from local to state administration, except for individual studies such as the Digital Transition Strategy of the County of Istria. Data on the state of digitisation are available at the level of the Croatian Digital Indeks (Perić, 2021).

As per the Croatian Digital Index study (Perić, 2021), nearly half of the companies in Croatia consider digital transformation as one of the top ten priorities. However, most assume that digitalising analogue business processes will effortlessly resolve digital challenges. Consequently, most companies entrust their IT department to manage digital transformation challenges. Digital transformation is widely recognised in the business community as a crucial shift in traditional organisational practices, leveraging digital technologies and innovative business models to enhance performance and adaptability in a constantly evolving landscape (Kraus et al., 2021). However, only 17.7% of companies in the Republic of Croatia have established a comprehensive digital transformation strategy, while 25.1% of respondents have no intention of pursuing such a strategy. Additionally, the survey reveals that 88% of participants acknowledge the impact of digital transformation on a company's operations, regardless of whether it succeeds or fails. These findings suggest that corporate leadership may not fully grasp the importance

¹ ERP (Enterprise Resource Planning) and CRM (Customer Relationship Management) are software solutions that can increase business performance. Both serve as databases and connect different departments within the company. CRM and ERP can be united into a single software, or they can be separate solutions.

of adapting to changes in the business landscape or leveraging digital advancements to enhance competitiveness (HINA, 2020).

Active leadership support and employee engagement are crucial for successful digital transformation. (Li, 2015). Educating and empowering employees to use new technologies and encouraging innovative thinking are essential (Schwarzmüller et al., 2018). The digital transformation process involves continuously adjusting to the ever-changing digital landscape, building lasting capabilities for innovation, and effectively managing communities over time (Mingardon et al., 2018).

2. Literature review

2.1. Digital technologies

Digital technologies encompass diverse cutting-edge innovations that leverage digital computing and communication systems to revolutionise society and daily life. Given their extensive applications, these technologies substantially influence our daily communication methods, work habits, leisure pursuits, and information management practices (Brynjolfsson & McAfee, 2014; Greenfield, 2017).

A key characteristic of digital technologies is their ability to represent and manipulate data in digital format using binary language (Qi, Qinglin et al., 2022). This digital language enables fast and precise information processing, which has resulted in the development of sophisticated computer systems, software, and network technologies (Ibid., 2022).

The Internet connects people worldwide and enables real-time information exchange, revolutionising everyday life with smart devices and connected household appliances.

Artificial Intelligence (AI) is a kind of digital technology that mimics the intelligent behaviour of computers (Raj & Kos, 2023). Computers can learn from experiences, identify patterns, make decisions, and solve problems with this technology, resulting in progress in health, education, industry, and public administration (Tomić et al., 2022, p.8). Data storage and retrieval have been revolutionised by the emergence of cloud computing, which eliminates the need for physical storage on multiple local devices. This newfound flexibility has made exchanging and accessing diverse forms of information more accessible. Moreover, digital technology has given rise to new business models, such as e-commerce, digital marketing, and online services, which have become essential components of the global economy (Hou, 2023). In the digital age, all organisations must leverage opportunities to stay ahead. As technology evolves, significant changes in operations are expected. Remaining current is crucial for competitiveness.

2.2. Digital transformation

The term "digital transformation" lacks a clear definition and is often oversimplified as merely using digital technologies to transform an organisation (Wessel et al., 2020, p. 7).

As per Gray and Rumpe (2017), the field of digital transformation recognises two significant concepts. The first concept, "transformation," refers to continuously evolving an initial situation into a superior one. The authors (Ibid.) explain that this involves a series of evolutionary optimisations related to new forms of business, production, logistics, medicine, and other social changes within the target domain. The second concept, "digital," suggests that information technologies will drive significant societal, business, and industry changes. These technologies enable real-time data processing and intelligent use, providing all stakeholders with improved knowledge about their processes and products (Ibid.). Digitisation, in this sense, enables the optimisation and automation of all production activities and techniques of various forms.

According to Spremić (2017), digital transformation is a comprehensive and expedited overhaul of business processes, capabilities, and models. Its purpose is to fully leverage digital technologies' potential and impact on society in a strategic and prioritised manner.

Large datasets must often be processed as part of this transformation. To do so effectively, models must describe the data's structure and facilitate efficient manipulation. Digital transformation models result from selecting, combining, and aggregating data to extract valuable insights. Software is crucial for managing, handling, and visualising these models to ensure efficient data manipulation (Kurmann & Arpe, 2017; Aras & Büyüközkan, 2023).

In the modern era, digital business has emerged as a transformative force that generates fresh value for individuals and organisations. As we move beyond the conventions of traditional economies, the focus has shifted to harnessing data and fostering transparency, both of which are integral to driving competitiveness and enhancing performance.

2.3. Digital transformation of public administration

In recent times, there has been a rising expectation among citizens that the public administration should offer top-notch and easily accessible digital services. The increased need is due to the effective execution of digital transformation plans in different private sector organisations. Digital transformation aims to enhance public service quality and boost public administration's productivity, transparency, and cost-efficiency. This, in turn, results in higher levels of citizen satisfaction (Kitisios et al., 2023, p.1). In the past, digitisation primarily involved converting analogue services into digital ones to optimise government processes. However, digital transformation goes beyond that by completely revamping government services to adapt to evolving user demands (Mergel et al., 2018, p.3). This effort prioritises internal and external users involved in the digital transformation of government services (Ibid.)

It is essential to recognise that the digital transformation of public administration requires a comprehensive overhaul of all aspects of an organisation's operations through the strategic implementation of digital tools. This encompasses all facets of the business, including personnel, culture, processes, partnerships, and other stakeholders. More than simply upgrading the IT system is required to achieve this complete transformation (Lugavić, Azapagić, 2022. p. 95).

Numerous studies on digital transformation within the public sector have revealed two prominent trends. Firstly, public administrations increasingly utilise new technologies to ensure citizens can access a wide range of information. Secondly, there is a growing emphasis on fostering interaction and connectivity between public services and citizens via existing information and communication technologies (Matias, 2020). In digital transformation, the benefits of enhancing the delivery and accessibility of services are typically analysed, leading to improved efficacy within the public sector (Kitisios et al., 2023, p.3)

Based on our observations, the ongoing digital transformation in the public sector is centred around migrating service delivery from offline to online platforms. In the Republic of Croatia, we can see notable progress in the digitalisation of public services, particularly in the shift from traditional paper-based systems to digital ones, such as the e-citizens portal (Gov. hr, 2024), which is indicative of a significant digital shift.

While many discussions surround the digital transformation pathway, experts agree that there are still several concerns. Objectively, despite having the opportunity to implement digital transformation, Croatia has yet to be successful. Croatia has accumulated a myriad of disconnected and uneven digital services, primarily built on outdated technologies and concepts sold to the state by companies such as APIS IT or FINA (Ivančić, 2024).

3. Research Methodology

3.1. Research Design

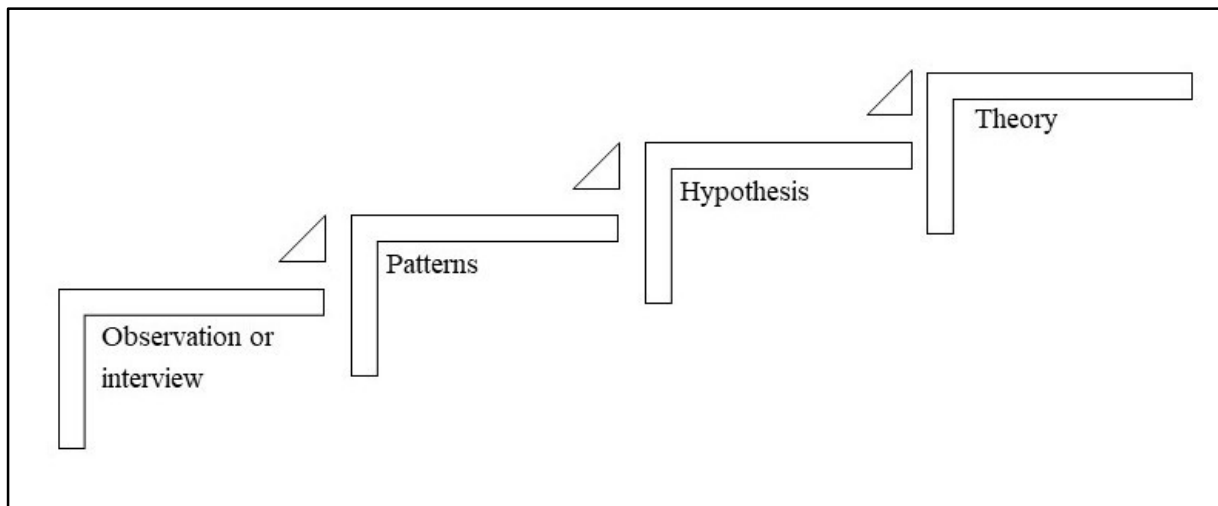
This research aims to analyse the digital transformation process in the public sector through a qualitative research design. The study employed qualitative research methods to understand better the experiences, perceptions, and challenges faced by government officials engaged in digital transformation projects.

Interpretivism was the chosen research methodology for this study, which utilised the grounded theory principle (Glasser & Strauss, 1967) with an inductive approach to develop a new theory (see Figure 1). Bakker (2019) emphasised that the approach is rooted in the reality of observation, participant observation, and interviews in everyday life situations in the present moment.

The data for the study was collected through semi-structured interviews with key stakeholders, decision-makers, and digital technology experts who were actively involved in digital transformation initiatives within government organisations in the County of Istria. The semi-structured form provided flexibility in questioning and guaranteed coverage of all pertinent subjects. Participants were carefully selected

through purposive sampling to provide a comprehensive representation of various government departments and levels of involvement in digital transformation initiatives. A standardised interview protocol was developed to maintain consistency, including open-ended questions covering critical subjects such as project implementation, encountered obstacles, utilised tactics, and perceived effects of digital transformation

Figure 1. Inductive approach stages



Source: Authors' elaboration

Research investigations have several formulated questions, which include but are not limited to:

RQ1. What level of comprehension do the participants have regarding digital transformation?

RQ2. What are the primary drivers, objectives, and challenges identified by the stakeholders throughout the digital transformation journey?

RQ3. How do participants perceive the execution, impacts, and subsequent assessment within the citizen engagement framework?

RQ4. What are the future outlooks of participants regarding digital transformation?

The research focused on addressing various research questions and discovering corresponding findings. The questions above laid the groundwork for additional discourse while simultaneously enabling participants to articulate their more comprehensive viewpoints, which constituted a primary objective of the study.

3.2. Research casing

Based on the research conducted by Glaser and Strauss in 1967, it is suggested that a minimum of ten interviews be performed to obtain relevant and reliable analysis. Their findings emphasise the

significance of adequate sample size to ensure accurate and meaningful results. A smaller number of interviews could lead to partial or biased conclusions. Therefore, it is recommended that researchers and analysts adhere to this benchmark when planning their study and collecting data. In this particular study, a total of twelve decision-makers and experts in the field of digital technology were interviewed.

Participants were provided with comprehensive information about the study's aims, methods, and rights as participants before the interviews to ensure ethical standards were upheld. Before commencing the interviews, consent was secured from all participants. Identifying details were anonymised to safeguard confidentiality, and data was stored securely to prevent unauthorised access.

3.3. Analysis of Data

A research study was conducted, consisting of twelve interviews with a diverse group of participants. Among the group were two female and ten male participants, six holding decision-making positions, and four experts in their respective fields, and two digital technology users. Four participants had completed university education, three held a master's degree, and five had earned a doctoral degree. The participants were employed in various governmental institutions within Istria County, highlighting the breadth of roles and responsibilities represented in the study (see Table 1).

Table 1. Sociodemographic profile of participants

Participants code	Interview duration	Function	Criteria	Education	Gender	Income
P1	35 min	Mayor	Decision Maker	Doctoral Degree	Male	High income
P2	44 min	Mayor	Decision Maker	Doctoral Degree	Male	High income
P3	45 min	IT Lead	IT Expert	Bachelor Degree	Male	Middle income
P4	55 min	IT Lead	IT Expert	Bachelor Degree	Male	Middle income
P5	59 min	Director	IT User	Doctoral Degree	Male	Middle income
P6	32 min	Director	IT User	Master Degree	Female	High income
P7	29 min	IT Lead	Decision Maker	Doctoral Degree	Male	High income
P8	38 min	IT Lead	IT Expert	Master Degree	Female	Middle income
P9	45 min	Mayor	Decision Maker	Bachelor Degree	Male	High income
P10	55 min	Mayor	Decision Maker	Master Degree	Male	High income
P11	63 min	IT Lead	IT Expert	Bachelor Degree	Male	High income
P12	33 min	Mayor	Decision Maker	Doctoral Degree	Male	High income
TOTAL	533 min					

Source: Authors' elaboration

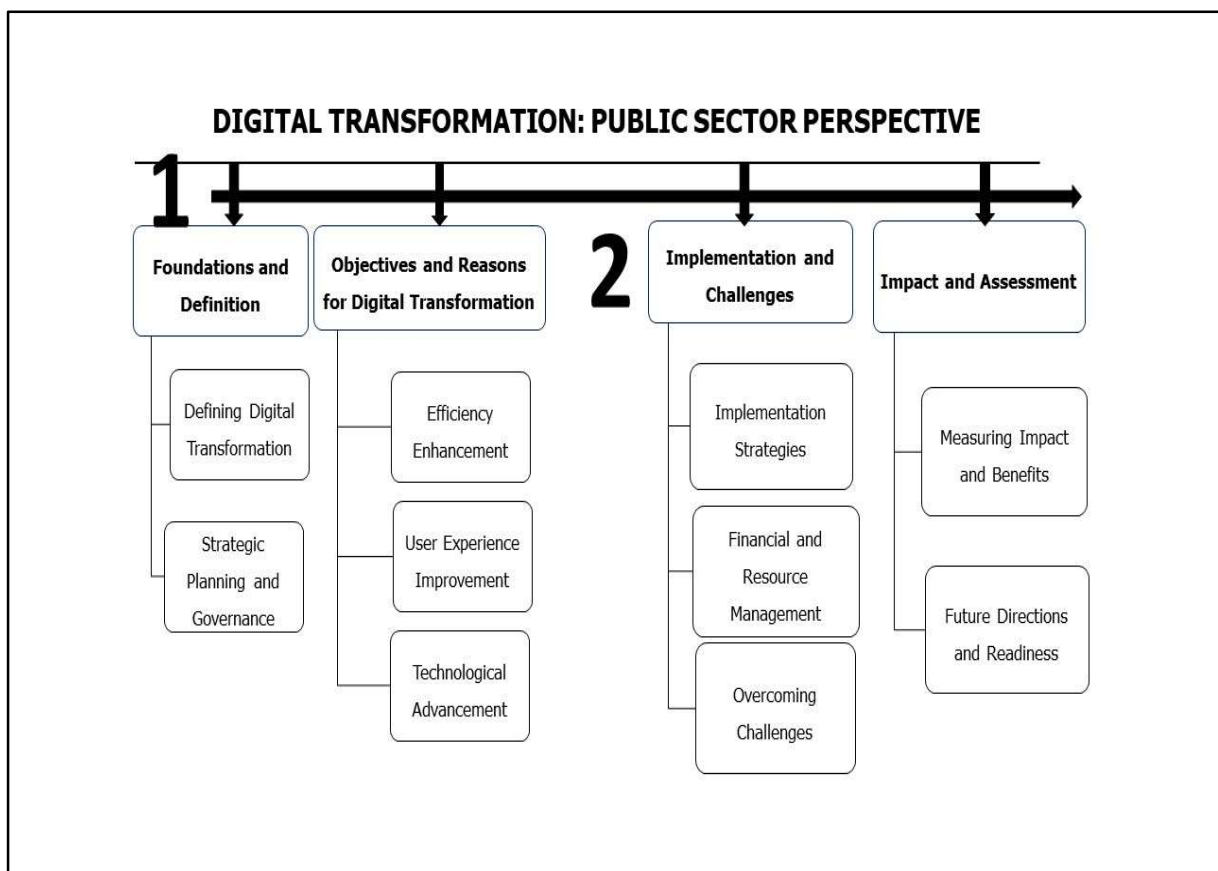
Ten interviews were conducted in person, and two were conducted online using the Google Meet application. All interviews were recorded with the participants' consent for further analysis.

A thorough analysis was conducted on the data gathered from the interviews to address the research questions. The QDA Miner software 2024.0.2 was utilised as an auxiliary tool to code and analyse data from 12 interviews during the first coding cycle, following the methodology established by Glaser and Strauss in 1967. To ensure the accuracy and reliability of the coding process, two researchers independently conducted initial coding and resolved any discrepancies through discussion until a consensus was reached. A thematic analysis method was used to detect repetitive patterns or themes in the data, which were then systematically documented. The iterative process continues until higher-level themes and sub-themes are established through ongoing comparisons.

3.4. Research Findings

After initial coding, thematic analysis was conducted, carefully encompassing relevant themes within meaningful categories. The researchers reached a consensus on the final categorisation based on the research questions and the participants' perspectives on the research topics, thereby establishing a grounded theoretical model for digital transformation (see Figure 2).

Figure 2. A grounded theoretical model of digital transformation in a public sector



Source: Authors' elaboration

Researchers consistently compared emerging themes while conducting coding and thematic analysis, developing four dimensions with subthemes. (see Appendix 1)

3.4.1. Dimension One: Foundations and Definition

The first dimension involves stakeholders' perspectives on the definition and importance of digital transformation, their understanding of its foundational elements, and their subjective emotions towards the research concept.

Digital transformation is broadly defined as using technology to improve enterprises' performance or reach radically. This involves clearly explaining the problem it aims to solve, such as inefficiencies or outdated processes. The importance and rationale of digital transformation lie in its potential to drive innovation, enhance customer experience, and improve operational efficiencies.

Participants generally identified digital transformation as converting analogue to digital, integrating various software solutions, enhancing existing business processes, and implementing new technologies based on computers, applications, and programs to accelerate or improve the efficiency of specific tasks.

„Digital transformation involves enhancing the business model of an organisation through digital advancements.“ (P1)²

"Digital transformation involves integrating and utilising new computer-based technologies, applications, and programs to streamline and enhance the efficiency of specific tasks." (P3)

„ Digital transformation means facilitating the operation of municipal administrations, specifically public administration." (P8)

Within the second subtheme, it was unanimously acknowledged that digital transformation is crucial and that strategic planning and governance are vital for successful digital transformation. However, most participants are not familiar with existing strategies or believe there is a lack of strategy at all levels of government: national, regional, or local.

„ It seems that a regional digital transformation strategy does not exist.“(P1)

„We currently do not have a clear plan at the local level for digital strategy, but we are considering creating one to meet regulations in the future.“(P5)

A clear strategy and roadmap are critical for guiding the transformation process. Some participants noted that the County of Istria has an existing strategy for digitising public administration. Additionally, they noticed the need for action plans and map routes, communication channels, and formal linkages.

² Participant code

Although certain cities and local governments have digital transformation strategies, the participants must be aware of any current national-level strategy.

„ ... at least at the level of the County of Istria, I know that there is a Strategy on the general digitisation of public administration and the use of these new modern technologies.“ (P8)

„ We have not implemented a strategy at our local level, so it is not present, and we do not have any plans for its implementation.“ (P9)

„At the local level, we have our city development strategy, which we have defined in cooperation with the local community. In doing so, we get down to details such as business plans and programs that are relevant to our community.“ (P10)

Government involvement is a prerequisite for ensuring coordinated efforts and policy support. Dedicated entities such as the Digitization Office and the National Recovery and Resilience Plan (Government of the Republic of Croatia, 2021) oversee and facilitate these efforts. However, several participants mentioned a need for more formal ties or connections with the Digitization Office, while others praised its help with the digital transformation process.

„I think there is some agency, but I am not sure.“ (P7)

„ So, in my opinion, the state should communicate what it wants from all of us with some kind of basic services; it should take a leadership role and say "you will do it this way" and then we could all be connected because once again we have a discontinuity and dichotomy of different systems, each of which is a local unit self-government.“ (P1)

„We must have contact with relevant institutions such as the State Office for Digitization of Society, through which we establish communication with other cities and gain access to a broader digital transformation. This communication enables us to consult and access external experts or consultants for specific projects.“ (P11)

„State Office for Digitization of Society encompasses a governmental department dedicated to digitalisation, specifically emphasising digital transformation. While the precise nomenclature eludes me, we inevitably engage in ongoing correspondence with this entity.“ (P1)

State authorities are collaborating with the EU to ensure that digital transformation initiatives align with the strategic goals outlined by the European Commission in 2020 (European Commission, 2020).

3.4.2. Dimension Two: Objectives and Reasons for Digital Transformation

The participants recognise that digital transformation aims to improve efficiency across various aspects. They have pointed out that reducing paperwork reduces physical storage requirements and less environmental impact.

„I have been able to categorise customer segments more efficiently with digitisation, which used to take three days to do manually. We used to offer poor service. Digitisation has reduced costs by requiring fewer people to do the same work, and process optimisation encompasses all repetitive tasks. Digitisation can significantly enhance not only speed but also consistency.“(P2)

„We believe we have significantly accelerated the pace of the work. We managed to reduce the cost of certain items in one part. “(P3)

„The efficiency and importance of improving the speed at which data is processed is crucial. Efficiency is critical, leading to a better user experience. This benefits all users and signifies transparency and equality for everyone. “(P4)

Providing fast services to citizens using digital tools to deliver quicker and more responsive services is identified as a significant factor in the digital transformation process. It is essential to make system improvements, such as upgrading software and hardware, to ensure smoother and more reliable operations.

“ Citizens can more easily access city services via telephone or internet, which reduces the need for physical trips to the location. “(P9)

Automation and streamlined workflows are implemented to minimise delays and improve productivity. Reducing operational expenses and optimising resource use achieve cost savings. Furthermore, digital transformation improves precision and accuracy by reducing human errors and enhancing data quality.

„The introduction of digital tools can improve the productivity of employees in the administration, reducing manual tasks and enabling focus on more critical activities. “(P3)

Improving user experiences is a central objective of digital transformations. Enhanced user experiences are achieved by designing more intuitive and user-friendly interfaces. Connectivity and compliance are improved through integrated systems that facilitate better communication and adherence to regulations. The availability of information is increased by making data accessible anytime and anywhere. Open access to information promotes transparency and trust:

„Transparency of data and decisions can increase citizens' trust in your organisation. “(P3)

User participation in digital transformation processes ensures that services meet their needs and expectations. Robust user authentication mechanisms enhance security and trust in digital services. Additionally, well-designed web interfaces and one-stop points simplify user journeys by providing comprehensive services in a single location.

Significant technological advancements are propelling digital transformations. Ensuring the smooth integration of various systems and devices is crucial. Implementing customised software solutions to meet the needs of digital transformations addresses organisational requirements. These software

solutions often incorporate advanced technologies such as Big Data, AI, Virtual Reality, Cloud computing, Social Media, Web technologies, GIS, and Intranet systems. These tools improve IT infrastructures and enable more advanced data analysis, communication, and operational capabilities.

„Our City Management utilises cutting-edge tools like Big Data analysis, artificial intelligence (AI), virtual reality, and Internet technologies to facilitate digital transformation. Additionally, they employ an internal cloud system for their servers and websites to guarantee data security and accessibility.“ (P12)

“ I believe it is crucial, particularly in today's era, for all spatial planning applications to be connected to geodesy and everything citizens can visually compare, accessible through a single application platform.“ (P7)

“ The digitisation of processes is a major objective involving implementing authentication tools and managing passwords. There are also plans to transition to the National Identification and Authentication System (NIAS)³ to enhance security and productivity. All these efforts underscore the necessity and significance of digital transformation for the efficient operation of the city's administration in a contemporary digital landscape.“ (P11)

3.4.3. Dimension Three: Implementation and Challenges

A clear and unified strategy can lead to clarity and disorder among decision-makers. A cohesive approach gives decision-makers direction, resulting in misalignment and inefficiency. Additionally, the lack of alignment and agreement across different levels of authority causes conflicts and hinders effective governance and implementation. By addressing these challenges, implementation strategies can be better aligned, reducing confusion and improving compliance within the state.

„The primary issue is the lack of clarity in our strategy or the absence of one. We are uncertain about our direction. There is no clear consensus on the collective goals for public administration in the Republic of Croatia. What would be the ultimate objective of implementing this digital transformation? Therefore, a lot hinges on the desires and preferences of the leaders and employees in cities and municipalities across Croatia.“ (P11)

Having clear implementation plans to carry out digital transformations is essential.

„Organizational change requires clear communication and support to facilitate the transition.“ (P6)

Securing funding and managing resources effectively are also crucial aspects of this process. Participants agreed that all financial resources originate from the annual budget, EU funds, and project activities.

³ NIAS is a system that represents the central point of user identification and authentication when signing up for an e-service. Its basic function is the safe and reliable provision of electronic identification and authentication services using credentials.

„Within the budget, a part is invested in the purchase of new computers, software, and sometimes even for teaching the employees themselves how to use the same software.“ (P6)

„Generally speaking, cities allocate a certain percentage of their budget to digitisation projects and modern information systems. This percentage may vary depending on the overall financial priorities of the city.“ (P12)

Participating in procurement processes and EU tenders can also help acquire the required technologies and services. It is essential to give employees training and development opportunities to ensure they have the necessary skills. Proper supervision and effective time management are crucial to keep projects on track and achieve their objectives." „We are currently seeking European projects to enhance our initiatives. A colleague played a key role in registering projects and broadening our access to European funds.“ (P10)

The public procurement system should be transparent, fair, and consistent for any request. The procurement process is the same when it comes to digitisation. Digital change initiatives frequently face multiple obstacles. More qualified personnel and technological know-how can help progress. Overcoming resistance to change and clarifying strategy are typical challenges that necessitate efficient change management.

„We have a broad range of resistance that can come from employees being unwilling to accept changes, hesitant to embrace digital technology because it is unfamiliar and resistant to learning and internal changes.“ (P2)

„When discussing digital transformation, the primary obstacles often involve handling change, informing individuals about new technologies, adjusting current systems and procedures, and guaranteeing the security and privacy of data.“ (P9)

Technical challenges often emerge due to system incompatibility, which can lead to issues with data sharing and communication between different systems. Additionally, the need for centralised access points can pose challenges in managing and securing access to sensitive information.

„There was a push for a standardised national digital transformation, but it stalled midway due to shifts in choices and options. Consequently, various institutions developed their platforms, leading to an inability to integrate across different systems.“ (P2)

Additionally, financial constraints and excessive paperwork can hinder transformation efforts. Furthermore, fear of new technologies among public administration employees and citizens' need for more awareness of technological advancements can slow adoption.

„The main challenges include the requirement to dedicate a specific amount of time and energy to become proficient in these new tools, and similarly, the apprehension of not being able to fully grasp the potential that this new technology can offer when it is unfamiliar.“ (P6)

„Some segments of the population, especially older individuals, may struggle to embrace change. Initially, there was some resistance to introducing new initiatives, particularly among this group. We made an effort to be adaptable and responsive to their needs. I want to highlight that we even organised workshops and training sessions specifically for older adults to improve their computer skills. Through these workshops, we aimed to introduce some of the solutions we were developing to the community.“ (P3)

3.4.4. Dimension Four: Impact and Assessment

Evaluating digital transformations involves using Key Performance Indicators (KPIs) and other measurement indicators. These metrics help gauge the positive impact on business costs, operational efficiencies, and societal values. User satisfaction and data security are crucial factors that demonstrate the success of digital initiatives.

Digital transformation brings numerous benefits to the community, such as increased access to information, fostering trust among community stakeholders, expediting decision-making processes with relevant data and statistics, saving money, minimising bias in decision-making, enhancing user satisfaction, and making processes more accurate and appropriate. One participant specifically described the impact of digital information as revolutionary.

„I believe that the impact of digital transformation is revolutionary. Once users master these tools, they can enhance efficiency and access a high-quality instrument for improving business.“ (P6)

Participants indicated that they are still determining the methods for measuring the impacts of digital transformation using various KPIs or other indicators. However, they have identified several approaches for determining improvements during specific periods, such as „...the number of received and resolved requests“ (P9), „...performance index...“ (P2), „...citizens feedback...“ (P7), „...public sector employee feedback, particularly those from the first line as communal officers...“ (P9).

Participant 9 emphasised the challenges of measuring the impact and linking it to the volatile term of perception: *“Perceived impression holds significance, even if it cannot always be quantified with numbers.”*

The future of digital transformations entails continuous evolution and adaptation to new technologies. Plans for sustained development involve ongoing innovation and upgrading of digital capabilities. Adaptability, infrastructure, and strategic alignment assess organisational readiness for digital

transformation. Public perception and commentary on digital transformation also play a crucial role in its success, emphasising the importance of communication and stakeholder engagement.

Citizens' involvement is crucial in the digital transformation process as it is one way to gain more knowledge about what must be done.

„We organise focus groups with different sectors of civil society and experts“ (P10)

„The involvement of citizens in public consultations is a widely recognised occurrence.“ (P12)

„Citizens provide their opinions or suggestions through surveys that we conduct once a year.“ (P2)

„We are creating a platform that allows all citizens to take part in their local committee by classifying projects and voting on specific projects within each local committee.“ (P9)

Speaking about readiness, all participants concurred that each local community member should be receptive to change and actively facilitate digital transformation that is more effective, efficient, and relevant to everyone.

Participant 2 expressed concern about *„how many individuals would be willing to embrace it and how self-critical they would be in acknowledging the need to change this administrative model's functioning.“*

All stakeholders are aligned on the next steps, including the following key components: IT leadership, continuous education, enhanced use of EU funds, and, critically, formulating a strategy and roadmap for upcoming initiatives. This statement represents the position of all participants.

4. Discussion and Conclusion

The grounded theory framework, stemming from a study on digital transformation in the public sector, identifies four specific dimensions with categories and subcategories:

Dimension 1: Foundations and Definition (defining digital transformation and strategic planning and governance),

Dimension 2: Objectives and Reasons for Digital Transformation (efficiency enhancement, user experience improvement, and technological advancement),

Dimension 3: Implementations and Strategy (implementation strategy, financial and resources management, and overcoming challenges),

Dimension 4: Impact and Assessment (measuring impacts, benefits, future directions, and readiness).

Researchers used an interpretative method to comprehensively analyse participants' perspectives on digital transformation. The research revealed a complex, dynamic, multi-faceted, and evolving digital transformation landscape, shedding light on numerous associated issues and dilemmas.

Communities and individuals often think they fully understand digital transformation, but upon closer examination, they discover many overlooked and misunderstood aspects. This study sought to uncover the current state of digital transformation in the County of Istria by evaluating participants' attitudes and understanding of digital technology and the digital transformation process. The grounded theory-based qualitative approach was chosen as a valuable tool for developing a new conceptual model for digital transformation. This method enabled a more comprehensive range of opinions, allowing participants to delve into the topics covered in the interviews and beyond and share their personal experiences.

After completing a carefully executed initial coding cycle and thematic analysis, it became apparent that four dimensions, along with corresponding themes and subthemes, naturally aligned in a hierarchical pathway. The first two dimensions, labelled one and two, can be viewed as the natural and essential *initial first phase*. Participants recognised that every digital transformation process must begin with a clear definition and understanding of the digital transformation concept's significance and meaning. Subsequently, a distinct, precise, and unique strategy, spearheaded by the leading authority, should be established as the first phase. During this phase, it is crucial to clarify the reasons for undertaking the process and the objectives that must be achieved. Governance should adopt a top-down approach; all entities and individuals involved should mutually agree.

The second phase covers dimensions three and four, focusing on implementation, resources, and opportunities throughout the process. It culminates in impact assessment and the establishment of a future agenda. Readiness is crucial in planning future steps, as all stakeholders must understand the need to act promptly. Participant 2 has already expressed concern regarding the willingness to embrace and accept the need for change.

The proposed model derived from the research can be a valuable tool for establishing the process from the beginning until the end of the second phase and for continuing future steps. Digital transformation is not a project with a deadline; it is a permanent, progressive, and volatile process.

Each dimension covers specific themes and subthemes in detail. **Dimension One** emphasises *Foundations and Definitions*, aiming to enhance participants' comprehension of digital transformation by using technology to improve business performance and expand reach. It emphasises the importance of effective implementation through strategic planning and governance while highlighting strategic shortcomings at different government levels. **Dimension Two** explores the *Objectives and Reasons* for Digital Transformation, where participants identify efficiency enhancements, user experience improvements, and technological advancements as primary objectives. This dimension underscores the

diverse aims of digital initiatives, encompassing tasks such as reducing paperwork and implementing cutting-edge technologies like AI and Big Data.

Dimension Three explores *Implementation and Challenges*, shedding light on methods for achieving digital transformations, such as employee training and EU-funded projects. It also outlines various obstacles that impede transformation efforts, including resistance to change, technical challenges, and financial constraints.

Finally, **Dimension Four** focuses on *Impact and Assessment*, emphasising the significance of measuring the impact of digital transformations through KPIs and other indicators. It underscores the future trajectory of digital transformations, emphasising continuous evolution and the importance of organisational readiness, innovation, and stakeholder engagement.

The four dimensions and their respective themes and subthemes can serve as a comprehensive model for strategising, executing, and overseeing the digital transformation process in both public sector and business environments. It can be utilised as a step-by-step guide, laying out what should be done and what should be avoided.

The grounded theory framework provides a thorough understanding of the intricacies of digital transformation in the public sector. It offers insights into the underlying principles, goals, implementation strategies, challenges, and impact assessment. The findings highlight the need for improved strategy, communication barriers, and apprehension or resistance to change. Non-cooperation is frequently observed in communities that require additional resources, knowledge, and a willingness to participate in essential activities.

Finally, researchers kindly requested any further comments following the interview. However, only three participants had additional contributions to make.

"An interesting topic that represents our present, not the future, and we must act quickly to function as an organised public administration." (P1)

„The process of digital transformation is no longer just a choice for businesses; it has become an unavoidable reality and a necessary obligation.“ (P2)

„The shift to digital technology is essential. We are heavily focused on digital transition, and I believe we should undertake it collectively. It would be beneficial to have a framework that specifies the required annual allocation for the digital transition.“

4.1. Limitations of research

The results of this study may only be universally applicable to some government organisations or contexts. The viewpoints and experiences shared by the participants are specific to the group that was under scrutiny. Like any qualitative research, the researcher's biases and perspectives can influence the

interpretation of the findings. However, researchers have been transparent about their analytical process and have used reflexivity to minimise subjectivity. Furthermore, they validated their findings through data source and researcher triangulation, cross-checking them against multiple sources and involving second opinions. They also ensured inter-coder reliability through rigorous coding procedures and ongoing discussions among the researchers.

The results of this specific research should be regarded as a significant milestone in future scientific experiments and research. This grounded theory model can be a solid foundation for future studies and experiments.

4.2. Future research

The study recommends delving deeper into Croatian citizens' viewpoints on digital transformation, extending the focus beyond the confines of the Istria Peninsula to encompass a more comprehensive national perspective. A blend of qualitative and quantitative research methods is advocated to provide a more in-depth insight into the subject, capturing the nuanced opinions and experiences of diverse demographic groups across the country. Such a mixed-methods approach would enable data triangulation, enhancing the findings' reliability and validity.

Despite being relatively unexplored, this study area has the potential to contribute significantly to practical applications in various sectors, such as education, healthcare, and public administration, thereby supporting Croatia's broader digital agenda. By addressing gaps in the current literature, the research could inform policy-making, drive technological innovation, and improve the delivery of public services. Moreover, the findings could enhance our scientific knowledge by uncovering the socio-cultural factors influencing digital transformation in Croatia.

Furthermore, future research should consider delving into different philosophical perspectives on digital transformation, such as technocentrism, socio-technical systems theory, and digital humanism. Examining these perspectives could lead to more profound discussions on digital technologies' ethical, social, and economic implications. This theoretical diversity would enrich the academic debate and provide a holistic understanding of the digital transformation process.

The proposed framework could undergo rigorous quantitative analysis in public and private sectors, facilitating a comparative study between these two distinct environments. Such an analysis would reveal sector-specific challenges and opportunities, providing actionable stakeholder insights. For instance, understanding the digital maturity levels, adoption barriers, and strategic priorities in each sector would enable the development of tailored interventions to accelerate digital transformation. This comparative approach could also highlight best practices and foster cross-sector collaboration, ultimately contributing to a more digitally advanced society.

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Appendix 1. Four dimensions with central themes and subthemes							
Dimension	Category	Code	Code Description	Count	% Codes	Cases	% Cases
Foundations and definition	Defining digital transformation	Software solutions implementation	Software solutions for the digital transformation implementation process.	3	0,50%	2	20,00%
	Defining digital transformation	Concept definition	A clear definition of digital transformation is an important starting point for transformation.	13	2,30%	6	60,00%
	Defining digital transformation	Digital transformation importance	Identifying why a digital transformation is essential.	14	2,40%	6	60,00%
	Strategic planning and governance	State as a leader	The national government must be the leader in the transformation process.	4	0,70%	3	30,00%
	Strategic planning and governance	Communication channels	Communication channels must be established at all governmental levels.	11	1,90%	3	30,00%
	Strategic planning and governance	Roadmap	All participants must create and adopt a roadmap.	3	0,50%	3	30,00%
	Strategic planning and governance	National Plan for Recovery and Resilience	National Plan for Recovery and Resilience covers a digital transformation process.	2	0,30%	2	20,00%
	Strategic planning and governance	Governmental levels	Governmental levels assume all three levels: national, regional, and local government.	8	1,40%	6	60,00%
	Strategic planning and governance	Strategy	A digital transformation strategy must be set up and adopted.	25	4,40%	8	80,00%
	Strategic planning and governance	Digitisation Office	The Digitisation Office is in charge of the digital transformation process in a state.	27	4,70%	7	70,00%
	Strategic planning and governance	Agenda EU	Agenda EU demands progress in digital transformation.	2	0,30%	1	10,00%

Objectives and reasons for digital transformation	Efficiency enhancement	Information availability	Making information available to all communities.	6	1,00%	2	20,00%
	Efficiency enhancement	Paperwork elimination	Elimination of paperwork and speeding the processes.	6	1,00%	4	40,00%
	Efficiency enhancement	Compatibility	compliance and cooperation with all hierarchical levels.	5	0,90%	1	10,00%
	Efficiency enhancement	Efficiency	Efficiency is a high priority for everyone.	15	2,60%	6	60,00%
	Efficiency enhancement	Minimising work costs	Work costs should be minimised, and there should be fewer employees for more work.	8	1,40%	4	40,00%
	Efficiency enhancement	Connection and compliance	Connect all legal and institutional levels in the compliance model.	4	0,70%	4	40,00%
	User experience improvement	Fast service for citizens	Faster service delivery to the local community.	4	0,70%	4	40,00%
	User experience improvement	Open access to information	Open access to information makes a better community environment.	6	1,00%	5	50,00%
	User experience improvement	Improved user experience	User experience is better, faster, and	10	1,70%	4	40,00%
	User experience improvement	system improvement	For a better user experience, the system must be improved every year.	6	1,00%	5	50,00%
	User experience improvement	User experience improvement	Making the user experience fast and better.	7	1,20%	5	50,00%
	User experience improvement	Civil society values	Civil society values are highly appreciated in the digital transformation system	3	0,50%	2	20,00%

	Technological advancement	Data	Data must be secured; all information should be highly protected from intruders.	22	3,80%	8	80,00%
	Technological advancement	Web and mobile apps	Authentication through website and mobile applications.	5	0,90%	1	10,00%
	Technological advancement	E entry	Entry on the website for e-services.	5	0,90%	3	30,00%
	Technological advancement	Email	Authentication through email.	1	0,20%	1	10,00%
	Technological advancement	One stop point	One-stop point website for entry into the services platforms.	5	0,90%	3	30,00%
	Technological advancement	Web interface	Website interface as authentication.	15	2,60%	5	50,00%
	Technological advancement	AI	Artificial Intelligence	9	1,60%	8	80,00%
	Technological advancement	Big Data	Big Dana	5	0,90%	5	50,00%
	Technological advancement	Cloud	Cloud	7	1,20%	7	70,00%
	Technological advancement	GIS	GIS (spatial planning)	10	1,70%	4	40,00%
	Technological advancement	Intranet	Intranet (internal communication channel)	1	0,20%	1	10,00%
	Technological advancement	Social Media	Social Media (Facebook, X, Reddit, etc)	6	1,00%	5	50,00%
	Technological advancement	virtual reality	Virtual reality	6	1,00%	6	60,00%

	Technological advancement	Website	Website	9	1,60%	3	30,00%
Implementations and challenges	Implementation strategies	Strategy confusion	There is no unique strategy, so there is a mess among decision-makers.	7	1,20%	3	30,00%
	Implementation strategies	Incompatibility with all levels of authority	There needs to be state compliance.	5	0,90%	3	30,00%
	Financial and resource management	Croatian Institute for Public Health	HZZO is one of Croatia's financial resources.	3	0,50%	1	10,00%
	Financial and resource management	Public procurement	The public procurement process must be transparent and fair.	20	3,50%	8	80,00%
	Financial and resource management	EU funds and projects	EU funds are one of the financial resources.	3	0,50%	2	20,00%
	Financial and resource management	Budget resource	The governmental budget must provide enough money for transformation.	10	1,70%	6	60,00%
	Overcoming challenges	Lack of central entry point	There needs to be a central point or institutional leader who leads the process.	1	0,20%	1	10,00%
	Overcoming challenges	Inputs confusion	There are many diverse inputs, causing confusion and disarray.	3	0,50%	2	20,00%
	Overcoming challenges	Execution control missing	There is no control over the final execution.	1	0,20%	1	10,00%
	Overcoming challenges	Lack of educated staff	More educated people are needed in the process.	7	1,20%	6	60,00%
	Overcoming challenges	Lack of money	Lack of money is a huge problem. Digital transformation is an expensive process.	9	1,60%	5	50,00%
	Overcoming challenges	Lack of plans	More concise plans need to be made to achieve the objectives.	2	0,30%	1	10,00%

	Overcoming challenges	Lack of time	There needs to be more time for doing the process due to regular activities.	7	1,20%	3	30,00%
	Overcoming challenges	Ignorance of technology by citizens	Citizens are not familiar with technology, particularly older generation	6	1,00%	4	40,00%
	Overcoming challenges	Resistance to change	Resistance to change is present among people.	14	2,40%	7	70,00%
	Overcoming challenges	Paperwork issue	Duplicating work with paperwork and digital work.	2	0,30%	1	10,00%
	Overcoming challenges	Diverse software	Noncompliance because of different software	1	0,20%	1	10,00%
	Overcoming challenges	Public sector employee attitude	Employees often do not want to be involved or want to avoid additional duties.	22	3,80%	7	70,00%
	Overcoming challenges	Fear from new	Fear of new things because of ignorance and lack of self-confidence.	1	0,20%	1	10,00%
Impact and Assessment	Measuring impacts and benefits	Indicators for measurement	How to measure digital transformation impact?	20	3,50%	5	50,00%
	Measuring impacts and benefits	KPI's	Which KPIs are adopted to measure the impact of digital transformation?	4	0,70%	2	20,00%
	Measuring impacts and benefits	Citizens participation	Citizens must participate in the digital transformation by providing comments, advice, suggestions, etc.	51	8,90%	8	80,00%
	Measuring impacts and benefits	Users satisfaction	Everyone is satisfied with the impact, including public sector employees and citizens.	3	0,50%	3	30,00%
	Measuring impacts and benefits	Positive impact	This transformation is seen as very positive progress.	9	1,60%	7	70,00%
	Measuring impacts and benefits	Precision	Precision is achieved without bias or subjective perspectives.	1	0,20%	1	10,00%

	Measuring impacts and benefits	Revolutionary impact	Digital transformation has a revolutionary effect on life and work.	2	0,30%	2	20,00%
	Measuring impacts and benefits	Process acceleration	Processes are accelerated, which is suitable for users.	5	0,90%	3	30,00%
	Measuring impacts and benefits	Efficiency	Efficiency is achieved.	4	0,70%	4	40,00%
	Measuring impacts and benefits	Costs savings	Cutting costs is a must for every company, so it is also for the public sector.	3	0,50%	2	20,00%
	Future directions and readiness	Financial resources	Planning the financial resources for digital transformation.	2	0,30%	1	10,00%
	Future directions and readiness	Plans	Making plans for digital transformation.	11	1,90%	3	30,00%
	Future directions and readiness	Next steps	Planning the next steps in digital transformation, including long-term plans.	11	1,90%	5	50,00%
	Future directions and readiness	Readiness for change	Everyone must be ready for change.	3	0,50%	2	20,00%
	Future directions and readiness	Boot camp	Boot camp is a way of acquiring the knowledge needed for successful digital transformation.	3	0,50%	2	20,00%
	Future directions and readiness	Educational program for employees	Employees in the public sector must be educated in the digital transformation field.	3	0,50%	1	10,00%
	Future directions and readiness	EU project	EU project can significantly help achieve the objectives of digital transformation.	1	0,20%	1	10,00%
	Future directions and readiness	IT as an educational leader.	IT departments must take the lead in the knowledge requirement.	5	0,90%	1	10,00%

Source: Authors' elaboration