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Executive Summary

This document provides a consolidated overview of the key findings and recommendations from the analysis of the current state and needs in four critical areas that are essential for the successful digital transformation of small and medium-sized enterprises (SMEs) and traditional industries. The analyses covered: digital maturity of traditional industries, systemic needs and gaps in innovation capacities, the level of SME readiness for digitalization, and operational challenges in delivering digital transformation services by digital innovation hubs.

The analysis of digital maturity in traditional industries revealed that a large number of organizations still operate with a low level of digital integration. Although there is growing awareness of the importance of digitalization, concrete strategies, resources, and competencies required for implementing sustainable change are lacking. It is recommended to develop targeted training programs, provide subsidies for technological investments, and build local partnerships.

The systemic needs and gaps analysis highlighted the absence of coordinated mechanisms for data-driven decision-making, insufficient cross-sector collaboration, and fragmented sources of support. There is a clear need to establish platforms for inter-institutional cooperation, as well as to develop shared tools and standards for data collection, exchange, and utilization.

The third section assesses the readiness of SMEs in Serbia to undertake digital transformation. The findings indicate increasing interest in digital tools, but also identify several barriers, including a lack of skilled personnel, limited access to financing, and the need for more intensive mentoring and practical support. It is recommended to develop modular support programs tailored to the various stages of digital development of companies.

The fourth section examines the challenges faced by digital innovation hubs in delivering transformation services. Identified issues include low visibility, inconsistent service structures, lack of integrated communication tools, and the need to strengthen a shared identity and operational coordination among hubs. Key recommendations include improving internal infrastructure, aligning more closely with end-user needs, and developing unified access points.

The overarching conclusion from this comprehensive analysis is that the potential for digital advancement is significant, but it can only be realized through coordinated and structured interventions that connect strategy, training, infrastructure, and cross-sector cooperation. This document therefore serves as a guide for the continued development of policies and programs that promote an inclusive, sustainable, and systemic approach to digital transformation.

2. Abbreviations and acronyms

Abbreviation / Acronym	Description
SME	Small and Medium-sized Enterprises
EDIH	European Digital Innovation Hub
AI	Artificial Intelligence
ICT	Information and Communication Technology
R&D	Research and Development
KPI	Key Performance Indicator
TRL	Technology Readiness Level
ERP	Enterprise Resource Planning
B2B	Business-to-Business
B2C	Business-to-Consumer
ML	Machine Learning
EU	European Union
IoT	Internet of Things Innovation
API	Application Programming Interface
DT	Digital Transformation
DTM	Digital Transformation Manager
EC	European Commission
GDP	Gross Domestic Product
IP	Intellectual Property
NACE	Statistical classification of economic activities in the European Community
RTO	Research and Technology Organization
TWG	Thematic Working Group
WP	Work Package
XR	Extended Reality
CRM	Customer Relationship Management
GDPR	General Data Protection Regulation
HR	Human Resources
ISO	International Organization for Standardization
KAM	Key Account Manager
NGO	Non-Governmental Organization
ROI	Return on Investment
SaaS	Software as a Service
UI	User Interface
UX	User Experience

3. Background

The present document constitutes the Deliverable 2.1. Identification and Matchmaking in the framework of the Flagship Project S4AI_HUB – Serbian European Digital Innovation Hub on Artificial Intelligence. As described in the S4AI_HUB project, this deliverable lays the foundation for systematically tracking the performance and impact of the hub's activities. It contributes to the overarching goals of the Digital Europe Programme by ensuring transparent, evidence-based progress monitoring and supports alignment with broader EU efforts aimed at strengthening digital innovation capacity, particularly in the field of Artificial Intelligence.

4. Objective/Aim

This document provides a consolidated overview of key findings and recommendations derived from a comprehensive needs and gap analysis in four critical domains essential for the digital transformation of small and medium-sized enterprises (SMEs) and traditional industries in Serbia. These domains include: the digital maturity of traditional industries, systemic innovation gaps, SME readiness for digitalization, and challenges faced by Digital Innovation Hubs (DIHs) in delivering transformation services.

The aim of the document is to support the development of structured, evidence-based interventions that enhance digital competitiveness and resilience. It identifies strategic and operational challenges across sectors and proposes actionable recommendations related to capacity building, infrastructure improvement, intersectoral collaboration, and user-centered service delivery.

By aligning insights from multiple thematic areas, the analysis contributes to the formulation of integrated policies and programs that foster inclusive, sustainable, and innovation-driven digital transformation throughout Serbia's economic and public ecosystems.

5. *Needs and gaps analysis for digital transformation of SMEs in Serbia*

5.1. Digital Maturity Analysis of Traditional Industries

5.1.1. Introduction: Digital trip through traditional industries

In the dynamic environment of the 21st century, where technology shapes every pore of society and economy, traditional industries face an existential challenge: adapt or be left behind. Digital transformation is no longer a luxury reserved for tech giants – it has become a prerequisite for competitiveness, resilience, and growth.

This report explores the joint path of traditional industries such as construction, hospitality, trade, transport, and IT services towards digital maturity. We don't look at them separately, but look at them as part of the same larger ecosystem trying to keep up with the rapid pace of innovation.

Through standard digital maturity models (such as the Deloitte Digital Maturity Model and CMMI), we analyzed four key pillars: technology, process, human resources, and strategy. The focus was on identifying the realistic level of integration of digital tools and platforms, the degree of automation, the readiness of employees to accept new technologies, and the clarity of the strategic direction towards digital transformation.

Our journey through these industries revealed a landscape that is both rich in innovation and burdened by traditional barriers – a kind of map of the world where some trails to digitalization have already been blazed, while others still await their pioneers.

- Technology: Foundation that is not firm enough yet

Technology is often perceived as the most visible sign of digital transformation, but what this analysis reveals is that its presence is not the same as its effective application.

At first glance, traditional industries have made certain steps: the application of software solutions for project management in construction, digital reservations in hospitality, e-commerce platforms in trade, delivery tracking systems in logistics, and sophisticated development platforms in the IT sector. However, a deeper analysis reveals several layers of problems:

- Fragmented digitalization

Most technology implementations are ad-hoc, often initiated by short-term needs (e.g. online bookings during a pandemic) without connecting to a wider, integrated infrastructure. Tools function as "islands" without bridges – useful in isolation, but limited in their potential to create comprehensive digital ecosystems.

- Technology as support, not as a transformer

Companies often see technology as a tool to optimize existing processes, rather than as an opportunity to redefine the way they do business. For example, the implementation of an ERP system in commerce facilitates inventory management, but rarely leads to a complete restructuring of the supply chain based on analytics and predictive models.

- Infrastructural inequalities

There are significant differences in the level of technological infrastructure. While some sectors use cloud computing, mobile applications, and IoT to optimize operations, others still rely on local servers, manual data entry, and basic tools such as Excel spreadsheets. This non-uniformity makes a huge difference in the capacity for scaling, agility, and security.

- Resistance to innovation

A culture that favors proven methods of work is often at the root of the slow implementation of technology. Fear of change, lack of digital leaders within organizations, as well as insufficient understanding of the possibilities that new solutions bring, slow down the adoption of advanced technologies such as artificial intelligence, process automation, and big data analytics.

Aspect	State in industries
Use of ERP/CRM systems	Present in medium and large companies, minimally integrated in small companies.
Implementation of IoT solutions	Limited to logistics and transport (delivery tracking, route optimization).
Cloud services	Increasingly present in IT and trade, but construction and hospitality remain conservative.
Mobile applications and tools	Actively used for customer support, less for internal optimization.
Cyber security	It is perceived as a side field; serious investments in security are still rare.

- Conclusion

Technology in traditional industries looks more like a mosaic than an organized network. Although bright spots exist, the full potential of digital transformation remains unrealized until technology is integrated deeply into the structure of business, and until it becomes a catalyst for fundamental change, not just a tool for marginal optimizations.

5.1.2. Processes: The invisible nervous system that needs reconstruction

If we can think of technology as the muscles of an organization, then processes are its nervous system. They convey information, enable coordination, and define the way the company responds to changes and challenges. And right here, in the world of processes of traditional industries, we discover perhaps the most pronounced obstacles to digital transformation.

Imagine the following situation:
A small hotel in a seaside town has implemented an online booking system. Guests easily book rooms through the website, pay a deposit, and receive automatic confirmations. Everything seems perfect.

But behind the scenes, the situation is quite different.
Receptionists manually transfer data from the system to paper guest check-in books. The valets receive paper schedules, often with delays. If a guest makes a last-minute change – for example, changes an appointment or requests additional services – information is easily lost. The result?

- Guests waiting in the lobby because the room is not ready.
- Overlapping reservations.
- Nervous staff trying to "patch" problems.

In the end, despite the modern user experience in online booking, the actual stay experience falls due to inefficient internal processes.
Digitalization without a complete process transformation is like a facade without a foundation: beautiful on the outside, but unstable on the inside.

- Surface optimization, deep stagnation

In many companies, there have been certain improvements visible “on the surface” – digital bookings in hospitality, online ordering in commerce, basic delivery tracking in transport. However, underneath these innovations, the processes remained almost unchanged: manual controls, paper records, ineffective internal communications, and disjointed information flows.

In other words, what the user sees as “fast and digital service” is often supported by old, inefficient internal procedures that are only temporarily “patched” by technology.

- Lack of end-to-end digitalization

Real digital transformation of processes implies end-to-end optimization – from the first contact with the customer, through operational activities, all the way to after-sales support. However, most organizations from traditional industries have digitalized only fragments of processes, often without clear architecture and integration.

For example, in commerce, sales channels are digitized, but inventory management, return of goods, or processing of complaints still work according to old manual models, which creates bottlenecks and increases the risk of errors.

- Processes “bound to the people”

In many cases processes are designed around key individuals rather than systems. Efficiency depends on the knowledge and experience of specific workers, rather than on standardized procedures supported by technology. This leads to great vulnerability: the loss of a key employee can seriously disrupt functioning.

- Low performance measuring level

Without precise measurements, there is no real optimization. In traditional industries, process analytics is still not widely implemented. Performance measurements, such as order processing time, error rate, or cost per unit of product/service, are rarely monitored systematically. The lack of this data means that companies often “drive blind”, without clear signals of where and how they can improve operations.

Aspect	State in industries
Automation of key processes	Partial: dominant in user interfaces, weak in internal operations.
Standardization of procedures	Minimal; there are basic procedures, but often informally defined.
Process data management	Poorly developed; data often resides in disconnected silos.
Performance Monitoring (KPIs)	Rarely set; it mostly relies on the subjective judgments of managers.
Process flexibility and scalability	Limited due to reliance on manual operations and individual employee skills.

- Conclusion

Processes in traditional industries are in a kind of limbo – between the need for modernization and the weight of inherited operating models. Without full end-to-end optimization, any technological innovation remains limited in scope.

For digital transformation to be successful, companies must redefine processes from the ground up, establish clear standards, implement automation where possible, and use data to continuously measure and improve performance.

It's not just the tools changing – the way of thinking about work changes.

5.1.3. Human Resources: A heart that must learn to beat to a digital rhythm

- Digital tools in the wrong hands

Imagine a company from the transport and warehousing sector that has invested in a top logistics platform for real-time tracking of deliveries. Managers are full of enthusiasm – they believe that they will soon reduce delays, increase accuracy and raise the level of customer satisfaction.

However, problems soon arise. Drivers and warehouse workers, used to working with paper documents and telephone instructions, have a hard time accepting the use of the new application. Some ignore it, others use it incorrectly, and still others give it up completely because they are afraid of making a mistake.

The result? The system does not provide accurate data, users are still dissatisfied, and the investment looks like a failure.

In reality, the problem was not the technology. The problem was people were not prepared to use the new technology.

Without investing in employees' digital skills, digital transformation remains a dead letter.

- Human resource analysis

In all the traditional industries we analyzed, one constant weak point clearly emerged: the lack of digital competence among employees. And it's not just a technical issue – it's a cultural challenge, a question of mentality, and willingness to change.

- Digital skills: New illiteracy

Just as reading and writing were once a prerequisite for functional participation in society, today digital skills are a prerequisite for functional participation in the economy. Unfortunately, in many companies, the digital literacy of employees remains at a low level.

- In construction and hospitality, employees often only use technology at a basic level (e.g. email, basic applications).

- In trade and transport, operational staff use applications, but without understanding the deeper functionalities that would enable optimization of work.

- Only in the IT industry do we notice a high degree of developed digital competences, but even in that there is a constant need for advanced education (e.g. cyber security, AI tools).

- Resistance to change: Fear of the unknown

Many employees, especially those with longer tenure, show a natural resistance to new technologies. This resistance is often not the result of bad will, but of fear – fear of losing control, of making mistakes, of losing one's job.
Without clear communication and support, any attempt to introduce new digital tools is met with passive or active resistance.

- Lack of organized education programs

Very few companies have systematic programs for developing digital skills. Instead of continuous training and support, digital education often depends on individual initiatives or ad-hoc training immediately before the implementation of new tools, which is not enough to gain the right understanding and security in work.

- Leadership and digital champions

Another key challenge is the lack of “digital champions” – employees who not only master the tools, but actively promote their use among colleagues. Without change leaders within the organization, transformation remains too dependent on management decisions and too little supported from below.

Aspect	State in industries
General level of digital skills	Low in most sectors; basic skills dominate, advanced skills are rare.
Training and education programs	Sporadic and disorganized; education is often reactive rather than continuous.
Resistance to digitization	Noticeable, especially in older employees and in industries with a strong work tradition.
Digital leadership	Limited; there are few employees who take an active role in promoting innovation.
Adaptability to new tools	Low to medium; it depends on previous experience and available support during introduction.

- Conclusion

Without people who understand and embrace technology, no digital initiative has a chance of long-term success.
Technology does not change the organization – people change it with the help of technology.

That is why investing in education, support, and building a digital culture is necessary.
When employees begin to see digital tools as an extension of their capabilities, rather than a threat, that's when the organization truly enters a new era.

5.1.4. Strategy: The compass that still shows the wrong way to many

- Project without a map

Imagine a construction company that decides to implement advanced BIM (Building Information Modeling) software to improve project management. They invest significant funds, hire consultants, buy licenses. Everyone expects quick results.

However, what nobody defined is:

- Which processes exactly need to be optimized?
- What are the goals they want to achieve?

- How will employees be trained?
- How will BIM align with the rest of the IT ecosystem?

The result?
BIM software remains half-used, only one sector of the company uses it, costs rise, and the expected benefits are never realized.

Without a clear strategy, even the best tools become expensive ornaments.
Digital transformation without strategic direction is like a journey without a map: lots of effort, little meaningful progress.

- Strategy analysis

Strategy is the foundation of any serious digital transformation. However, what we have observed in traditional industries is that digital strategy is either underdeveloped or completely absent. Even when there is an awareness of the importance of digitalization, the approach is often fragmented, reactive, and short-term.

- Digital initiatives without the bigger picture

Companies often start individual digital projects (e.g. creating a website, implementing a CRM system), but without fitting them into a wider, comprehensive vision of development. These initiatives function as separate projects, without mutual connection and clear contribution to the company's strategic goals.

- Short-term thinking: React, not lead

In many cases, digital transformation begins as a reaction to external pressures – the emergence of competition, changes in consumer behavior, or crises such as pandemics. However, in such circumstances, digitalization becomes an emergency measure rather than a long-term opportunity. Without strategic planning, companies end up with a bunch of disjointed tools and initiatives that don't deliver sustainable results.

- Lack of ownership for digital strategy

In traditional industries, it is rare to find a person or team solely responsible for digital transformation. Strategies are often developed "along the way", along with basic business plans, without sufficient attention, resources, and accountability.

- Ignoring culture as a key factor

The right digital strategy involves not only tools and processes, but also a change in company culture.

However, in many cases, the cultural dimensions of transformation (willingness to change, support for innovation, open communication) are neglected. Without a changed culture, even the best-laid strategy remains just a document in a drawer.

Aspect	State in industries
Existence of a formal digital strategy	Rarely present; more often there are individual projects without a common vision.
Ownership of the digital agenda	Unclear; often scattered between the IT sector and general management.
Planning horizon	Short term; focused on solving immediate problems rather than long-term innovation.
Connection between strategy and culture	Weak; transformation is seen as a technical rather than an organizational challenge.
Innovation capacity	Limited; there is a fear of failure and a lack of room for experimentation.

- Conclusion

Digital transformation without a strategy is like a ship without a compass.

Companies that want to survive and thrive in the digital age must look beyond technology – they must build clear, long-term, and integrated digital strategies that involve people, processes, and culture.

Real transformation begins with the question, “Where do we want to go?”, not “Which tool should we buy?”
Without an answer to that first question, each subsequent step is just wandering.

5.1.5. Key Indicators of Digital Maturity: Coordinates on the development map

- Navigation without a compass

Let's imagine a transport company that wants to improve its operations through digitization. They invest in a new application for tracking deliveries, set up a web platform for users, and even organize basic training for employees.

After a year, the director asks a simple question: “Are we better than last year?”

Silence.
Nobody knows the answer.

Why? Because they did not define any success metrics from the beginning. They did not measure the speed of deliveries, accuracy of information, user satisfaction, level of tool usage among employees.

Without key performance indicators (KPIs), all efforts remain without clear meaning and direction. Without measurements, we do not know where we are or where we are going.

- Analysis of Key indicators

Key indicators of digital maturity serve as landmarks on the transformation map – they clearly indicate strengths and weaknesses, show the degree of progress, and help companies smartly manage their resources and expectations.

In the analysis of traditional industries, we identified five key indicators of digital maturity, which we now describe in more detail:

- 1. Use of digital tools

Current level: High

Detailed analysis:

The use of digital tools is widespread, but often limited to basic functionalities. Companies use tools such as ERP systems for record keeping, CRM for customer tracking, ordering and reservation applications.

However, deep integration of those tools into day-to-day operations is lacking: systems often operate in isolation, without common databases or automated communication between sectors.

Typical weaknesses:

- Multiple parallel systems that do not communicate with each other.
- Using only basic functions of the software, without using advanced options such as analytics, prediction, task automation.
- Lack of continuity in the use of tools across all departments.

Why it is important:

Effective application of digital tools not only increases productivity, but also enables decision-making based on accurate, timely data.

- 2. Automatization of the process

Current level: Medium

Detailed analysis:

Automation appears primarily in simple tasks – automatic confirmation of orders, online tracking of deliveries, generation of invoices.
More complex processes, such as internal approval, inventory management, or logistics optimization, still depend on manual work and human intervention.
The integration of automation into processes is often not systemic, but project-based – carried out only for certain functions without connection to a wider workflow.

Typical weaknesses:

- Automation of only the "front end" of business (interaction with users).
- Weak implementation of RPA (Robotic Process Automation) solutions.
- Absence of system process maps before and after digitalization.

Why it is important:
Automation is key to reducing operating costs, increasing processing speed, and eliminating manual errors.

- 3. Presence on digital platforms

Current level: High

Detailed analysis:

Companies have recognized the importance of online presence, but most of them maintain a static approach to digital channels.
Websites often serve as digital brochures, without functionality such as online support, custom product/service configuration, or interactive customer tools.
Social networks are dominated by one-sided communication – product promotion without engaging users or tracking interactions through advanced analytics.

Typical weaknesses:

- Insufficient use of SEO and analytical tools to optimize presence.
- Weak personalization of user experience.
- Focus on visibility instead of engagement and conversion.

Why it is important:
Digital platforms are not only channels for promotion, but also vital sources of market data, user preferences, and new business opportunities.

- 4. Level of digital skills of employees

Current level: Low

Detailed analysis:
Basic literacy exists (use of the Internet, emails, simple applications), but advanced skills (software management, data analysis, digital security) are rare.
Many employees do not have the developed ability to work in a cloud environment, collaborate remotely, or think critically about digital processes.
Continuing education programs are ad-hoc, often implemented only before the introduction of a new tool.

Typical weaknesses:

- Lack of structured programs for the development of digital competences.
- Resistance to learning new technologies.
- Focus on technical skills without developing a digital culture.

Why it is important:
Without digitally literate employees, companies cannot use even 50% of the potential of available tools and innovations.

- 5. Strategic awareness

Current level: Medium

Detailed analysis:
Most organizations are aware that "something has to change", but lack a clearly defined strategy that

connects technology, people, and processes.
Digital initiatives are often focused on solving problems quickly, without planning for long-term resilience and scalability.
The connection between digital and business strategy exists only in the most developed cases.

Typical weaknesses:

- Lack of clearly defined objectives and measures of success of digital transformation.
- Fragmented management of digital projects without central coordination.
- Insufficient integration of culture and process change.

Why it is important:
Without a strategic orientation, digital transformation becomes a collection of disjointed projects, instead of a coherent path to innovation and competitive advantage.

Key indicator	Current level	Detailed analysis
Use of digital tools	High	Increased use of tools, but fragmented and superficial use.
Process automation	Medium	Automated simple tasks, internal processes still manual.
Presence on digital platforms	High	Good visibility, but passive interaction and poor data usage.
Level of digital skills of employees	Low	Limited ability to use advanced technologies.
Strategic awareness	Medium	The awareness of the importance is there, but without a deep-rooted strategy and culture.

- Conclusion

Key indicators of digital maturity show us not only where companies stand today, but also map clear points where attention should be focused in the future.

True digital transformation begins with systematic monitoring of these indicators, setting realistic goals and investing where weaknesses are most pronounced.

Without clear coordinates, any organization risks wandering – and in the digital age, wandering is often a luxury that leads to falling behind.

5.1.6. Conclusion: Digital transformation of traditional industries – between need and reality

Our comprehensive analysis of the digital maturity of traditional industries shows a landscape that is both rich in potential and fraught with challenges.

Industries such as construction, hospitality, trade, transportation, and computer programming have found themselves at a crossroads: will they remain shackled by outdated processes or will they bravely step into the era of full digitalization?

- The main insights that the analysis reveals:
  - Technology is present, but not used – most companies have implemented basic tools and platforms, but deep integration and utilization of full capacities remain rare.
  - Processes are superficially optimized – external functions (e.g. reservations, orders) are digitalized, while internal operational flows are still rudimentary and fragmented.
  - Human resources are lagging behind – the digital skills of employees are at a low level, which severely limits the capacity of companies to take advantage of technology.
  - Strategy is underdeveloped – digital transformation is too often implemented through a series of disjointed initiatives rather than being guided by a clear, long-term strategic direction.
  - Key indicators are not systematically monitored – without clear metrics and progress tracking, companies lose the ability to adapt and direct their digital initiatives.

This picture clearly shows that digital transformation is not just a technical issue – it is an organizational, strategic, and cultural change that requires a fundamental rethinking of the way of doing business.

- What should traditional industries do next?
- 1. Change of mentality

Companies must begin to see digital transformation not as a series of projects, but as a continuous process of change – as redefining their own organization for a new age.

- 2. Systematic approach to human development

Investment in people is key. Digital education must be embedded in all layers of the organization, through programs of continuous improvement, mentorship, and rewarding innovations.

- 3. Holistic process optimization

Digitalizing only “visible” processes is not enough. True transformation implies end-to-end optimization, connecting all phases of business, and eliminating unnecessary barriers between sectors.

- 4. Defining a clear digital strategy

Without a strategy, every step is random. Companies must set clear, measurable digital transformation goals related to broader business development.

- 5. Continuous measurement and adjustment

Success in the digital era comes to those who know how to track their progress, learn quickly from data and are not afraid to adjust direction when necessary.

- Final message:

Digital maturity is not a destination – it is a journey.
That journey requires:

- the courage to reexamine the established way of working,
- patience to build new foundations,
- and the wisdom to invest in what really counts – people, processes and culture.

Companies that understand that technology is not an end, but a tool to empower people and ideas, will be the ones that not only survive, but shape the future of their industries.

- Mapping the Existing Infrastructure: The foundations on which the future should be built

- Introduction to analysis: Why is infrastructure key?

Digital transformation is not a project that starts with implementing applications or migrating user experience to online platforms. Its real foundations lie much deeper – in an infrastructure that must be strong, flexible and scalable enough to support all future innovations.

Without a robust technical foundation, any initiative, no matter how ambitious, becomes hampered by invisible constraints: slow systems, unreliable networks, fragmented data, and an insecure environment. Infrastructure is what determines the speed, security, and capacity of an organization to truly transform, not just adapt.

In traditional industries – such as construction, hospitality, retail, transportation and computer services – this basic infrastructure has often not been a priority in the past. Investments were focused on physical assets, logistics, or personnel, while IT systems remained a “support function”. However, in the era of digitalization, it is precisely this “support function” that becomes the backbone of business.

The goal of this analysis is to:

- Map the current state of the infrastructure in key components: hardware, software, network capacity, and cloud services.
- Identify where there are limitations and gaps that can hinder digital development.
- Show what an improved infrastructure could enable – not only in terms of technical support, but also as a driver of innovation, productivity, and competitive advantage.

Without the right foundations in place, any attempt to build a modern organization risks collapsing under its own weight.

That is why in this analysis we start from the basics: to understand where we currently stand – and how ready that ground is to support the future.

When a supercar drives on macadam:

Imagine a trading firm that invests heavily in the latest e-commerce sales platform. The system has everything you need – cutting-edge design, integrated product recommendations based on artificial intelligence, advanced user features.

On the first day of putting it into operation – everything collapses.

Users are reporting that the page is loading slower than ever. The internal support team cannot access the database. Comprehensive analytics tools just don't run.

After investigation, it turns out to be a simple reason: the company's network is outdated, the servers are local and overloaded, and the Internet connection cannot handle even a basic level of traffic.

Investing in software without proper infrastructure is like putting a supercar on a macadam road – the potential is there, but the conditions destroy it.

5.1.7. Analysis of key infrastructure elements Review of existing AI tools:

- 1. Hardware (computers, servers, devices)

State:
In most traditional industries, hardware infrastructure is a serious barrier to development. Computers older than 5 years, local servers without adequate security updates, and a lack of mobile devices for field work are a common picture.
Many companies use equipment that is not designed to process large amounts of data or to support modern software solutions.

Consequences:
Outdated hardware causes slow system operation, increases the number of failures and interruptions, as well as a high level of vulnerability to security threats. The inability to process data quickly and work with demanding applications severely limits an organization's digital agility.
Also, limited access to mobile devices prevents effective collaboration between office and field teams.

Possible benefits of modernization:

The acquisition of modern hardware enables better performance, faster data processing, more efficient use of cloud services, and safer business. The flexibility of the workforce is also increased – by enabling mobile access to data and applications for employees in the field.

- 2. Software (operating systems, business applications, databases)

State:
Software infrastructure in traditional industries is often heterogeneous and unaligned. Companies use different versions of operating systems, business applications, and databases that are not integrated and often not even updated.
There are examples where vital systems run on outdated platforms without active technical support from the manufacturer.

Consequences:
Disjointed software systems lead to data duplication, information inconsistencies, and manual interventions that increase the possibility of errors. Outdated software becomes a security threat, as it is

easy prey for malicious attacks. It also makes it difficult to scale the business because the systems are not designed to support growth in data volume or users.

Possible benefits of modernization:

Introducing modern, cloud-ready applications and consolidating the software portfolio enables faster communication between teams, better data analytics, and safer, more scalable business. System integration through APIs or platforms increases efficiency and reduces operational costs.

- 3. Network capacities (internet connection, local networks, security)

State:
Network infrastructure is often designed for basic internal communication and Internet access, without taking into account the needs of digitalized processes such as cloud computing, remote work, or e-commerce operations.
Internet connections have limited speeds, local networks do not have capacity for high data flow, and security settings are basic and insufficiently adaptable to modern threats.

Consequences:
Poor network performance causes application slowdowns, communication interruptions, delays in working with databases, and the inability to reliably use cloud services.
Low network security protection increases exposure to cyber attacks, which can result in data loss, business interruption, or reputational damage.

Possible benefits of modernization:

Investment in high-quality network resources (e.g. optical Internet, modern routers, and security applications) enables stable and fast connection, secure communication, and easy expansion of business into the digital environment. The implementation of advanced security protocols (VPN, end-to-end encryption) significantly reduces risks.

- 4. Cloud infrastructure (adoption and use of cloud services)

State:
The adoption of cloud solutions in traditional industries is often unsystematic and limited to basic services such as email hosting and cloud storage. The full potential of Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), or Software-as-a-Service (SaaS) models for critical applications and data is rarely used.

Consequences:
Without an active cloud migration strategy, companies remain tied to expensive and hard-to-sustain local infrastructures.

The flexibility in resource scaling, the ability to quickly implement new applications, as well as the advantages of high availability and security offered by modern cloud providers are lost.

Possible benefits of modernization:
The strategic adoption of cloud infrastructure allows companies to scale their operations according to business needs, to access cutting-edge tools without large initial investments, and to increase the security and availability of their resources.
Cloud enables remote work, real-time collaboration, and better use of data through advanced analytics and AI solutions.

- Mapping the current state of infrastructure

Infrastructural element	Current state	Detailed analysis
Hardware	Outdated equipment, local servers	Slow work, vulnerability, limited mobility
Software	Incompletely updated systems, disconnected tools	Scaling issues, security risks
Network capacities	Limited Internet and LAN performance	Slow communication, low security
Cloud infrastructure	Superficial adoption of basic services	Lack of strategic flexibility and scalability

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- Conclusion: Infrastructure as the invisible foundation of future competitiveness

At first glance, infrastructure seems invisible – it exists somewhere in the background, a silent and imperceptible line of support for day-to-day operations. However, it is this silent foundation that often decides the fate of digital transformation.

Through this analysis, it became clear that traditional industries are still walking on a foundation that is not fully prepared to withstand the weight of modern digital business. It happens too often that hardware is older than it should be in the era of fast data and mobile work. Software systems are like jigsaw puzzles with missing pieces, while network connections are often too narrow for the traffic that the digital age brings. Cloud services, which could free organizations from the rigid framework of local infrastructure, are present, but still without a clearly defined role in the business strategy.

This image should not discourage – on the contrary, it should serve as a wake-up call. Infrastructure is no longer a secondary matter. Today, it is an active strategic resource, crucial for the speed of innovation, resistance to change, and the ability for organizations to quickly adapt to new market conditions.

Without investing in modern networks, reliable and secure servers, scalable cloud platforms, and modern tools, all other initiatives remain fragile – a beautiful facade placed on shaky ground.
On the other hand, companies that recognize infrastructure as a foundation and priority open the door to a more stable, efficient, and innovative business. They acquire the ability not only to follow changes, but also to lead them.

The future will not wait for those who hesitate.
It belongs to those who invest today not only in what is visible – applications, platforms, tools – but also in what is essential: an infrastructure that can carry them through every challenge and every opportunity. Because without a solid foundation, no vision, no matter how ambitious, can survive.

5.1.8. Identifying modernization needs: Where to invest for the future

- Introduction to the analysis: Modernization as a strategic investment, not a reactive fix

In a world where technology is developing faster than ever, traditional industries face pressure to adapt their operations to new market and user demands.
Digital transformation is no longer an option – it is becoming a requirement for survival and growth.
However, what is often overlooked is the fact that true transformation does not begin with the purchase of new tools, but with careful identification of the exact points of weakness within the existing infrastructure and business processes.

Many companies make the mistake of seeing modernization as a series of unrelated investments – new software here, faster internet there, a new server somewhere else.
Without clearly defined priorities and an in-depth understanding of what is really holding their business back, initiatives like this bring few real results, while at the same time wasting precious resources.

True modernization requires a strategic approach:

- It is necessary to identify key areas where investments can have the greatest impact.
- It is necessary to set priorities according to realistic financial possibilities and strategic goals of the industry.
- It is necessary to recognize what must be solved immediately, and what can be part of a broader, phased development plan.

This analysis starts from those very principles.

We aim to clearly map where traditional industries are most sensitive, where opportunities for quick wins are greatest, and where long-term change is necessary to make digital transformation not only successful, but sustainable.

Because modernization is not a race in which the one who invests the fastest wins – the winners are those who invest wisely, where it will have the deepest and most lasting effect.

- When we mend a boat instead of building a ship

Imagine a construction company that has relied on old tools for years: local servers, slow internet, and manual records. When they finally decide to "modernize" their business, they invest in a new server and upgrade a couple of software licenses.
However, the problems do not disappear – slow flow of information, inconsistent data, and work stoppages are felt by all employees.

The director then wonders: "How is it possible that we still have the same problems when we have invested in modernization?"

The answer is simple, yet painful:

Modernization is not the acquisition of individual solutions without a systemic vision. Without a clear identification of real needs and priorities, any investment becomes just a temporary patch on an ever-larger sinking ship.

5.1.9. Detailed analysis of key areas for modernization

- 1. Procurement of new equipment (hardware modernization)

State:
In many traditional industries, the hardware basis of business has been neglected for a long time. Computers five years old or older, outdated servers, and devices that do not support modern security standards are still the reality of most organizations.
Many employees use slow, unreliable hardware that is hardly compatible with new software solutions, which directly slows down operations and makes it difficult to implement modern tools.

Consequences:
Outdated equipment slows down all aspects of business – from data processing and communication to application and system access. Failure rates increase, leading to frequent outages and rising maintenance costs. In addition, security risks increase dramatically when older devices no longer receive security updates.

Benefits of modernization:

The procurement of new, energy-efficient and performance-optimized equipment enables acceleration of all business processes, reduces system response time, increases employee productivity and enables smooth integration with cloud and mobile solutions. Also, modern devices raise safety standards to a significantly higher level.

- 2. Improvement of network capacity and security

State:
The network infrastructure of many traditional organizations is not designed for intensive digital operations. Internet connections are often of low capacity, internal networks are not optimized for high-throughput data transmission, and security solutions are minimal, often based on basic firewalls and antiviruses.

Consequences:
Slow and unreliable internet seriously limits the possibility of using cloud services, remote work, online sales and real-time communication with clients. Weak network security increases vulnerability to cyber attacks, data loss, and business interruption, with potentially catastrophic financial and reputational consequences.

Benefits of modernization:

Investing in fast and stable networks (optical Internet, advanced Wi-Fi networks, security layers such as VPN and encryption) enables a reliable connection for all business needs. It increases data security and enables scalability – the network becomes capable of supporting business expansion, new applications, and dynamic work models such as remote work.

- 3. Implementation and expansion of cloud solutions

State:
In most companies, the use of cloud services remains limited and fragmented, often limited to simple functionalities such as email hosting or document storage. The true migration of key business applications and data to cloud platforms is rarely strategically planned.

Consequences:
Relying on local servers creates limitations in scalability, system resilience and resource availability. Local infrastructure requires constant investment in maintenance, security, and upgrades, which increases costs in the long run and reduces flexibility in responding to changes in market demands.

Benefits of modernization:

Cloud solutions allow companies to access almost unlimited IT resources without the need for large capital investments. They offer scalability, high availability, better security, easier collaboration between teams, and enable the introduction of advanced solutions such as AI services, Big Data analytics, and Internet of Things platforms.

- 4. Modernization of software platforms and systems

State:
The software landscape in traditional companies is often colorful and unsystematic. Different software versions are used, applications that are not mutually integrated, as well as databases that function as isolated “islands” without mutual communication.

Consequences:
Working in such an environment generates high complexity, increases the risk of errors, and makes it difficult to make data-based decisions. The absence of modern software architecture reduces operational efficiency and slows the introduction of innovations.

Benefits of modernization:

The introduction of modern, integrated software solutions enables more efficient management of business processes, greater accuracy of data, and faster decision-making. Connected platforms reduce operational costs, accelerate information flow, and facilitate business scaling.

- 5. Development of digital skills of employees

State:
Although more and more companies are implementing digital solutions, the level of digital competences of employees often does not follow this development. Many employees have basic computer skills, but lack a deeper understanding of how to use advanced tool functionality, how to effectively manage data, or how to work in cloud and mobile environments.

Consequences:
Without appropriate digital skills, implemented technologies remain unused or only partially used. Employees feel insecure, make more mistakes, and are resistant to change, which slows down digital transformation at the organizational level.

Benefits of modernization:

Systematic investment in digital skills development increases productivity, improves user experience, reduces resistance to new technologies and enables organizations to maximize the potential of new tools and processes. A digitally competent team becomes the engine of innovation and competitive advantage.

- Conclusion: Modernization as the foundation of strategic resilience

Through a careful analysis of the needs for modernization, it is clearly observed that the transformation of traditional industries is not a matter of desire, but of necessity.
The world we live in is constantly accelerating – technologies that were an innovation yesterday are the standard today, and may be surpassed tomorrow. In such an environment, companies that remain inert face a certain decline in relevance.

What has become apparent is that modernization cannot be reactive and fragmented.
Buying individual tools or upgrading just one segment of the infrastructure will not solve the deep challenges that are slowing down the business.
In order for modernization to have a real effect, it must be a complete process, based on a clear understanding of the priorities and interconnection of all elements of the digital ecosystem.

The identification of key areas – from hardware and network upgrades, through the expansion of cloud solutions, to the development of digital skills of employees – shows that successful modernization requires concerted action on several fronts simultaneously.
There is no “silver bullet” – no single technology will transform a company by itself.
Transformation is achieved by people who use technology wisely, within a system that is ready for it.

More importantly, prioritization becomes critical in a world of tight budgets and growing challenges.
It's not enough to know what to improve – you need to know what to improve first, where the investment will bring the greatest return, and how to ensure that each subsequent phase builds on the previous one.

A broader perspective: Modernization as evolution, not a revolution
Modernization does not come overnight. It is not a big moment in which everything changes – it is a series of carefully planned, interconnected steps.
Each new server, each upgraded network, each new employee skill is a step closer to an organization that has not only survived the digital age, but has used it to grow and develop.

Organizations that strategically map their needs today and smartly invest in modernization will have the flexibility to respond to crises, the agility to embrace innovation, and the resilience to survive even in the most unpredictable times tomorrow.

Modernization is not a matter of luxury – it is a matter of survival and opportunity.

The true power of modernization lies not in how fast we change technologies, but how wisely we change ourselves.

5.1.10. Recommendations for supporting traditional industries: We are building a path to a sustainable digital future

- Introduction to analysis: Recommendations for supporting traditional industries

As the corporate world races forward, driven by digital innovation, traditional industries often remain at a crossroads – aware of the need for change but facing complex obstacles. Change is not simple, especially for organizations whose structures, processes, and culture have been shaped by decades of working in the analog world.

Today, it is clear: digital transformation is not only a question of tools, but of profound changes in the way of working, thinking, and adapting to the market.

But that path is not easy or short.

Without systematic support, without clear guidelines, and without concrete resources, traditional companies risk being trapped in attempts that waste resources and do not bring real results.

They need recommendations that do not remain in theory, but offer:

- practical steps,
- clearly determined priorities,
- support in learning, implementation, and adaptation.

Support for traditional industries is not just about showing them what to buy or what to invest in. True support means guiding them through change – helping them build new skills, develop new infrastructure, adopt new ways of thinking about business.

This means allowing them to test solutions before investing, to have access to mentors, to receive subsidies when necessary, and most importantly — to feel that they are not alone in this transition.

In this area, we define specific recommendations to support traditional industries, grouped around three key pillars:

- improving the digital capacities of employees,
- modernization of infrastructure and tools,
- and implementation support mechanisms.

The goal is not just to enable them to initiate the change – the goal is to empower them to go through that change successfully and continue to grow independently.

Because true digital transformation does not happen overnight.
It is built gradually – step by step, decision by decision, with a clear vision and the necessary support at every step of the way.

- Just saying “digitalize” is not enough

Imagine a small company from the transport sector that has decided to embark on the path of digital transformation.
They bought new route management software, invested in several modern devices, and even tried to move part of the business to the cloud.
But after only a few months, they faced numerous problems: employees did not know how to use the new tools, the Internet network was too slow for cloud operations, and maintenance costs exceeded initial expectations.
There was no clear plan, no training, no support, no place where they could test solutions before investing.
In the end, the process that was supposed to make their work easier became an additional burden.

The lesson?

Digital transformation requires systemic support, not just good intentions.

5.1.11. Detailed analysis of recommendations

- 1. Training and development of digital skills of employees

When we talk about digital transformation, the focus is often on technologies, software, and applications. However, real change comes through people. Without employees who understand digital tools and processes, any investment in technology goes unused or misused.

In traditional industries, developing the digital skills of employees is a key point for long-term success. Many workers, although extremely experienced in their core jobs, have no formal education or experience in using modern digital solutions. Fear of new technologies, resistance to change, and lack of customized education further slow down the transformation process.

That is why it is necessary to approach the development of digital competences systematically, gradually, and practically. Training programs must be specific to the needs of each industry, focused on practical skills that are directly applicable in everyday work.
In addition, the development of an internal network of “digital ambassadors” – employees who will pioneer change and support their colleagues – will create a culture of learning and mutual growth.

Without investment in people, any technological investment remains without real effect.

Employees who believe in their digital skills become not only users of technology, but also carriers of innovation.

- 2. Implementation of digital tools and integrated platforms

One of the most common challenges that traditional industries face when trying to modernize is the disconnection of different systems and tools.
Companies often begin digitalization by introducing individual solutions to specific problems – a sales system here, a project management tool there – without a long-term vision of connecting all those tools into a functional whole.

Such a fragmented approach creates information "islands" within the organization, increases complexity, reduces efficiency, and makes decision-making difficult.
The real power of digital tools comes only when they are integrated – when systems "talk" to each other, when data flows smoothly across all sectors, and when automation eliminates unnecessary manual tasks.

That is why we recommend that the process of implementing digital tools is based on a clear integration strategy. We should strive to introduce comprehensive ERP systems that connect inventory, finance, project, and human resources management in a single platform.
Also, CRM solutions should enable monitoring of the entire customer life cycle, while RPA technologies can automate administrative tasks and free employees to focus on more complex and creative activities.

Without integration, digitization remains partial and does not reach its full potential.

- 3. Development and implementation of digital strategies

Digital transformation without a strategy is like a journey without a map.

In many organizations, modernization begins as a series of unrelated initiatives that solve individual problems but do not lead to a larger goal.
Without a clearly defined direction, resources are spent inefficiently, employees lose confidence in change processes, and the organization remains fragmented.

The development of a digital strategy must be the starting point of any serious attempt at modernization. It should answer the key questions: What do we want to achieve? Which areas of business will we digitize? At what pace? What are our priorities? What KPIs will we track to measure progress?

More importantly, strategy must not be created behind closed doors of management. It must involve all layers of the organization – from management to the operational level – so that everyone understands and accepts the direction that is being taken.

A well-developed digital strategy is not a static document.
It is a living plan that adapts, learns, and evolves along with the organization.

- 4. Upgrading the infrastructure

If digital strategy is the map, then infrastructure is the road that must be taken. Without an adequate technology foundation, no application, platform, or process will be able to function in a way that enables the speed, security, and scalability required for modern business.

In traditional industries, one often encounters outdated equipment, slow internet, fragmented internal networks, and insufficiently developed cloud infrastructure.
Without modernizing these foundations, any other digital initiative risks being limited in its functionality.

Infrastructure upgrades must involve more than just refreshing computers.
It is necessary to plan the procurement of equipment that supports advanced applications, modernize network capacities to support cloud and mobile work models, introduce high cyber security standards, and migrate key processes to flexible cloud platforms.

Only a stable and scalable infrastructure can be the real foundation for a sustainable digital transformation.

- 5. Support mechanisms for implementation

While knowledge and technology are important, support in the implementation process often makes the difference between successful and unsuccessful digital transformation.
For many organizations, especially smaller and medium-sized ones, the challenge is not only finances, but also a lack of internal resources, expertise, and security in making technological decisions.

That is why we recommend implementing mechanisms that will enable companies to safely and confidently go through the change process.
Subsidies and grants can provide easier access to capital for investments in equipment and software.
Technical support through specialized centers and consulting teams can help in planning, testing, and evaluating solutions.
Demo centers and test environments allow firms to try out technologies before committing to major investments, reducing the risk of making the wrong decisions.

Mentoring programs, where experienced digital business experts lead traditional companies through the transformation process, can provide invaluable support not only in the technical sense, but also in leading change through organizational culture.

Without such mechanisms, many companies will be left alone in the face of complex challenges.
With the right support, however, they can not only begin the transformation, but successfully complete it.

- Overview of recommended measures and support mechanisms

Field of support	Recommended measures and mechanisms
Development of digital skills	Courses, workshops, digital ambassadors, cooperation with educational institutions
Implementation of digital tools	ERP, CRM, RPA integrations for unifying processes
Development of digital strategies	The phase of defining the vision, plan, KPI, involving all levels of employees
Improvement of infrastructure	Modernization of hardware, network, transition to cloud solutions
Implementation support mechanisms	Subsidies, technical support, demo centers, mentoring programs

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- Conclusion: The right support brings the right transformation

Through clear recommendations and concrete support mechanisms, traditional industries are given what they need most: a secure framework for change.

Digital transformation is not an easy task, nor is it without risks. But with the right support –knowledge, resources, planning, and mentoring – it becomes not only possible, but sustainably achievable.

Companies that recognize the importance of systematic support and use it strategically gain the opportunity to build organizations that are agile, innovative, and resilient to the challenges of the future. They not only embrace change, but use it as a lever for growth.

Because the real power of digital transformation is not just in the tools we use, but in the way we build the path to use them together.

5.1.12. Connecting with other sectors: Building bridges for accelerated digital transformation

- Introduction to the analysis: Connectivity as a new basis of competitiveness

In the past, the success of traditional industries was often based on stability, control over resources, and a long-standing reputation.

But in the modern digital age, the rules of the game have changed.

It is no longer enough to rely solely on internal capacities and one's own experience – those who know how to open up, connect and learn from others make the fastest progress.

Digital transformation is not an isolated process.
It requires interdisciplinarity, combining different knowledge, technologies, and perspectives.
And that is exactly why connecting with other sectors – startups, academic institutions, government bodies, and business associations – is a key step in the evolution of traditional industries.

Startups bring speed, agility, and unorthodox solutions to problems that may be invisible to large systems.
Academic institutions bring in-depth knowledge, research capacity, and a long-term perspective.
Government, donors, and business networks provide resources, security, and strategic direction.

In a world where innovation is faster than planning and market rules are constantly changing, isolation leads to stagnation.
Connectivity, cooperation, and openness lead to survival and progress.

This analysis explores concrete ways traditional industries can build bridges to sectors that can help them accelerate their digital transition, reduce risks, and create entirely new opportunities for growth.

Because, just as throughout history roads, squares, and harbors enabled the spread of trade and ideas, partnerships and cooperation are the new infrastructure of future development today.

- When traditional strength finds an innovative ally

Let us imagine a manufacturer of building materials with a long tradition.

For decades, they have successfully marketed their products through traditional channels, relying on physical distributors and direct sales teams.

But the market is changing – customers want faster deliveries, online ordering, personalized solutions.

The company decides to approach a local startup specializing in e-commerce platforms and applications for smart inventory management.
Within a year, by jointly developing and implementing a customized digital platform, they increased sales by 25%, optimized inventory, and reduced distribution costs.

This story demonstrates a simple but often overlooked truth:
Connecting with innovative sectors not only accelerates transformation, but can completely redefine the rules of the game.

5.1.13. Detailed analysis of connectivity options

- 1. Cooperation with startups: Merging tradition and innovation

Startups are natural agents of change.

They think fast, experiment without fear of failure, and are focused on finding practical solutions to specific market problems.

For traditional industries, which are often structured around long-term processes and stability, cooperation with startups can be just what is needed to accelerate innovation and open up space for new business models.

Cooperation can take different forms:

- Joint development of new products and services, where startups bring technological solutions, and traditional companies bring market experience and infrastructure.
- Pilot projects, where the startup tests its solution in real industry conditions before starting a wider implementation.
- Investments and acquisitions, where companies can recognize the potential of startups and incorporate them directly into their operations as sources of innovation.

Examples from practice show that such cooperation can result in a drastic reduction of the time required for the development of new digital products, improvement of the user experience, and the opening of completely new market niches.

However, for collaboration to be successful, traditional companies must be willing to embrace the startup culture of flexibility, testing, and rapid iteration – which often requires a significant change in organizational culture.

- 2. Partnerships with faculties and research institutions: Knowledge that drives development

Faculties and research institutions are mines of knowledge and innovation that are often insufficiently connected to the real needs of industry.

For traditional companies, partnering with these sectors represents an opportunity to access cutting-edge research, technologies, and expertise, without having to build expensive development capacities themselves.

Such partnerships can be formed through:

- Joint research and development projects, where companies define challenges and researchers develop potential solutions.
- The use of academic laboratories and development centers, which reduces testing costs and accelerates the innovation process.
- Involvement of students and young researchers through internships, projects, and mentoring, thereby creating a new generation of digitally competent personnel adapted to the needs of the industry.

For example, collaboration with faculties may result in the development of advanced materials for construction, the application of IoT technologies to monitor transport processes, or the introduction of AI analytics in logistics operations.

What is crucial is the establishment of mutually beneficial relationships, where companies do not just look for ready-made solutions, but participate in the process of joint creation of innovations.

- 3. The role of the government, donors, and business associations: Creating an ecosystem of support

The digital transformation of an individual company cannot be viewed in a vacuum. It is necessary to create an entire ecosystem that supports innovation, enables cooperation, and reduces barriers to modernization.

In that network, governments, donor organizations, and business associations play a key role as catalysts for change.

Their support can have many dimensions:

- Financial support through direct subsidies for digital projects, research, and innovation. These funds allow companies to take the risks of investing in new technologies more easily.
- Regulatory support, through the adaptation of legal frameworks that facilitate cooperation between industry, startups, and academic institutions, and through the creation of programs that encourage joint initiatives.

- Connecting platforms, such as business clusters, innovation hubs and digital knowledge exchanges, where different actors meet, exchange ideas, and develop joint projects.

Without the active role of these actors, the transformation remains sporadic and left to individual initiatives.
When all parts of the ecosystem are in sync, digital transformation becomes affordable, scalable, and sustainable.

Field of connection	Description of the opportunity
Cooperation with startups	Development of joint projects, pilot solutions, investments in innovations
Partnerships with the academic sector	Joint research, use of laboratories, engagement of students
Support from other actors	Subsidies, regulatory relief, connection platforms

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- Conclusion: Connectivity as a strategic investment in the future

In a time where change is coming faster than ever before, no industry, no matter how strong and experienced, can carry the burden of transformation alone.

The digital era requires new alliances – alliances between experience and innovation, between academic knowledge and market practice, between the private sector and social support.

An analysis of the possibilities of connecting traditional industries with startups, faculties, and key social actors showed a clear path:
those who connect, grow; those who remain closed, stagnate.

Startups offer traditional companies the opportunity to accelerate their development, to experiment without a large initial risk, and to quickly test new solutions.
Cooperation with academic institutions opens the door to knowledge, research, and innovations that would be difficult to develop on their own.
Support from government, donors, and business associations builds the foundations of a healthy ecosystem where innovation is not just the privilege of the big, but available to all who want to thrive.

However, connectivity is not an automatic process.
It requires openness to new ideas, a willingness to share knowledge, as well as the ability to abandon the traditional way of thinking about competition and control.
Connectivity requires building trust, a shared vision, and investing in relationships, not just projects.

The most successful companies of the future will not be the ones that had the biggest budget or the most employees.
They will be those who knew how to recognize true partners, who built bridges where others saw walls. Those who understood that in the world of networks, strength does not come from isolation, but from cooperation.

For traditional industries, connecting with startups, faculties, and social actors is not just an opportunity – it is a necessary step on the way to a sustainable, agile, and competitive future.
The bridges they start building today will be the roads that will lead them through the challenges and opportunities of the world to come.

5.1.14. Final conclusion: The path of traditional industries through digital transformation

The digital transformation of traditional industries is not a matter of fashion or current trend.
It is a matter of survival, long-term competitiveness, and the ability of organizations to adapt to a world that is changing faster than ever before.

Through this comprehensive analysis, we looked at five key areas that together form the road map for a successful transition from the analog to the digital age.

- Findings from the analysis:

First, through the digital maturity assessment, we realized that many organizations have already taken the first steps towards modernization – they use certain digital tools, are present on online platforms, have initial automation initiatives.
However, these steps often remain isolated, unaligned with broader strategic goals, and without deep transformation of processes and culture.

Second, the mapping of the existing infrastructure showed that the technical foundations on which the digital future should be built are still not strong enough.
Outdated hardware, fragmented software systems, weak network capacities, and sporadic use of cloud technologies indicate that the modernization of the foundation is an imperative, not an option.

Third, through the identification of the needs for modernization, it is clearly defined that investments must be strategic, directed where they bring the fastest and most sustainable effect.
It is not enough to invest in new technologies – it is necessary to invest smartly: in people, in integrated systems, in scalable infrastructures.

Fourth, the recommendations for support showed that transformation cannot be an expectation placed solely on companies.

Systemic support is necessary – through employee training, strategic implementation of digital solutions, improvement of infrastructure, as well as through specific mechanisms of assistance in implementation: subsidies, technical assistance, mentoring.

Fifth, connecting with other sectors reveals that no industry can successfully go through digital change alone.
Cooperation with startups, academic institutions, and government structures becomes a new fuel for development – enabling faster innovation, easier access to knowledge and resources, and stronger resistance of organizations to future challenges.

- Core message:

The digital transformation of traditional industries is not just about technology.

It is, above all, a story about people, about the ability of organizations to learn, to adapt, to cooperate, and to build the new on the foundations of the old.

It requires the courage to leave established practices, the patience to invest in foundations, and the wisdom to choose the right partners on the path of change.
It requires strategic thinking, long-term vision and day-to-day operational consistency.

Companies that understand that digital transformation is not a one-time project, but a process of continuous development,
those who invest smartly, who build bridges, not walls – will be the ones who will not only survive the coming changes,
but will actively shape them.

The future belongs to those who have the courage to build it today.

5.1.15. Executive Summary: Digital Transformation of Traditional Industries – Vision, Foundations and Alliances for the Future

In an era of accelerated change, traditional industries face a challenge that goes beyond technical innovation – they face the need to deeply transform their processes, skills, and organizational models. This analysis maps five key areas that shape the path by which traditional industries can successfully transition into a digital future together.

- Digital maturity assessment

Traditional industries are already showing some steps towards digitalization – they are present online, use basic digital tools, and introduce partial automation.

However, in-depth analysis reveals that these efforts are often unsystematic, fragmented, and focused more on external aspects (toward users) than on internal transformation of processes, skills, and culture.

- Mapping infrastructure

Without a stable foundation, no digital initiative can succeed. Our mapping shows that most companies still operate on outdated hardware systems, with underdeveloped networks and superficial use of cloud technologies.
Infrastructure must be recognized not as operational support, but as a strategic resource that enables speed, security, and scalability of business.

- Identification of modernization needs

For the transformation to be sustainable, investments must be strategically prioritized. It is not enough to invest in the latest technologies – it is necessary to invest in what solves the deepest structural weaknesses: modernization of hardware, improvement of networks, adoption of cloud services and, most importantly, in the development of digital competences of employees. Smart modernization means choosing the points that bring the greatest effect with optimal use of resources.

- Recommendations for support

Digital transformation cannot be successful if the burden of change is shifted solely to organizations. Comprehensive support is needed: continuous training of employees, implementation of integrated platforms, development of clear digital strategies, and mechanisms such as subsidies, technical assistance, and mentoring programs.

Support must be ongoing and tailored to the specific challenges of each industry.

- Connecting with other sectors

In the digital economy, the ability to connect becomes the new competitive advantage. Partnerships with startups bring agility and innovative solutions, cooperation with the academic sector opens the door to the latest research and personnel, while the support of the government and donor organizations creates a stimulating environment for change.

Those who build bridges to knowledge, innovation, and resources will be at an advantage in markets that demand speed, flexibility, and creativity.

Key messages for further directions:

- Digital transformation is not a project with a beginning and an end – it is a constant process of adaptation and innovation.

- Infrastructure, processes, people, and strategies must be developed in parallel – investing only in one dimension is not enough.

- Support must be systemic and long-term – without it, individual initiatives remain isolated and insufficiently effective.

- Openness to cooperation with startups, academia, and key players accelerates transformation and reduces risks.

Companies that recognize these needs today, that invest in people as much as technology, that are not afraid to learn from others and build partnerships, will be the leaders of the world to come.

The future will not wait.
It belongs to those who build it today – strategically, wisely, and together.

5.2. Overview of Modern Tools and Infrastructure for the Application of Artificial Intelligence in Serbia

5.2.1. Review of existing AI tools:

The global and national landscape of artificial intelligence (AI) tools has rapidly evolved in recent years, reshaping how organizations, governments, and businesses operate and make decisions. This evolution has been fueled by advancements in various AI subfields, including machine learning (ML), natural language processing (NLP), computer vision, and, most recently, generative AI. These technological innovations have led to the creation of powerful platforms that can analyze vast quantities of data, automate routine tasks, generate content, detect patterns, and even interact in natural language.

Today, AI tools are no longer confined to research labs or large tech companies. They are increasingly accessible and applicable to a broad spectrum of users, from small startups to public institutions. This democratization of AI has significant implications for small and medium-sized enterprises (SMEs), which can now leverage intelligent systems to enhance efficiency, reduce costs, and gain a competitive advantage. Similarly, public institutions can use AI to modernize service delivery, streamline bureaucratic processes, and improve policy design through data-driven insights.

In Serbia, the deployment and adoption of AI tools are strongly supported by:

- The National AI Strategy (2025–2030): Adopted in early 2025, the updated strategy builds upon the 2019 framework, focusing on legal regulation, infrastructural investment, and support for innovation.
- Major investment in national AI infrastructure: Serbia is integrating high-performance computing systems to support advanced AI research and public service applications. These systems are designed to enable large-scale model training, language processing, and simulation tasks that were previously not feasible within the country.

AI tools can be categorized by ease of use, technical requirements, and target users. This classification helps decision-makers select tools that align with their organizational capacity, strategic goals, and operational challenges. The table below summarizes the main types of AI platforms and frameworks, along with their relevance for Serbia's SMEs and public institutions.

Type	Examples	Technical Skill Required	Best For	Relevance in Serbia
No-code / Low-code platforms	Microsoft Azure AI, Google Cloud AutoML, Amazon SageMaker	Low	Non-technical staff, prototyping	Widely accessible; potential for SME adoption with minimal training
Generative AI tools	ChatGPT, Google Gemini, Microsoft Copilot, Midjourney	Low	Text generation, automation, and creative tasks	Already used by startups and admin offices for drafting, summarizing, and communication
Developer frameworks	TensorFlow, PyTorch, Hugging Face, Scikit-learn	High	Technical teams, researchers	Core tools for research centers and technically advanced SMEs
Domain-specific solutions	Automatic Speech Recognition, BERTopic for email classification	Medium to High	Custom projects, vertical sectors (healthcare, telecom, media)	Developed locally for healthcare, media archives, and service automation
Open-source NLP models	SentenceTransformers, BERT (adapted to Serbian), spaCy	Medium	Text processing in the Serbian language	Crucial for handling language-specific public documents and communication in the public sector

Overview of AI Tools and Platforms

No-code and Low-code AI Platforms

Platforms such as Microsoft Azure AI, Google Cloud AutoML, and Amazon SageMaker allow users to create and deploy models through drag-and-drop interfaces. These platforms are ideal for organizations with limited technical resources and are highly scalable. They support various use cases, from document classification to fraud detection and sentiment analysis. These tools are particularly promising for:

- Local municipalities digitizing records,
- SMEs optimizing logistics or customer engagement without hiring data scientists.

Generative AI Platforms

Tools like ChatGPT, Gemini, and Microsoft Copilot provide immediate productivity benefits for both public and private users by generating text summaries and translations, drafting contracts, emails, and reports, and assisting in programming and debugging. These platforms are being increasingly integrated into public workflows and SME operations in Serbia.

Developer-Oriented Frameworks

For more advanced AI development, frameworks such as TensorFlow, PyTorch, Hugging Face (especially for transformer-based models), and Scikit-learn are indispensable. They allow for deep customization, but require technical expertise in Python and machine learning.

Domain-Specific AI Applications in Serbia

Among different specific applications currently emerging from the university centers and the startup ecosystem, local institutions have begun developing tailored tools for national use:

- Healthcare: IVI developed an AI-based system for breast cancer diagnostics, using deep neural networks and generative AI to estimate malignancy and aid radiologists.
- Media and Language: IVI's speech recognition model enables automatic transcription and search of archived TV content in Serbian.
- Telecommunications: BERTopic was used to build a topic classification tool for incoming customer emails at Telekom Serbia.

When evaluating the suitability of AI tools for local use, the following criteria are essential:

Criterion	Application
Availability	Most tools (especially cloud-based and open-source) are easily accessible in Serbia.
Ease of Use	No-code and generative platforms enable smaller teams and public administration workers to use AI without deep training.
Efficiency	AI tools already enhance diagnostic processes, customer support, and document workflows, contributing to cost reduction and faster service delivery.

Suitability of AI tools for local use

Despite encouraging developments, several structural and operational barriers remain:

1. Language Support: Most off-the-shelf AI models underperform in Serbian. There is a need for more local-language training datasets and Serbian-specific NLP tools.
2. Data Infrastructure: Many SMEs lack structured, labeled datasets for training; public institutions face legal and ethical constraints when handling personal data; data-sharing across institutions is fragmented.
3. Human Capital: AI literacy is still limited outside of technical sectors; there is a need for broader training programs for administrative staff, teachers, and business owners.
4. Cost and Long-term Sustainability: While open-source tools are free, full-scale AI solutions require investment in hardware/cloud infrastructure, skilled personnel, and continuous training to stay competitive.

5.2.2. Review of existing AI infrastructure:

Serbia has made important strides in developing a future-oriented AI infrastructure. The core of this ecosystem is the National AI Platform, operational since 2021 and hosted at the State Data Center in Kragujevac. This infrastructure is designed to provide scalable and reliable access to high-performance computing resources to a wide range of users, including researchers, SMEs, startups, and government institutions.

Criterion	Status in Serbia
Speed	The current platform includes four NVIDIA DGX-A100 systems (totaling 32 GPUs), enabling petaflop-scale computations.
Scalability	The infrastructure is modular and designed for expansion.
Reliability	Systems are hosted in a Tier IV data center, ensuring high reliability and secure access. User support and technical documentation are in place for onboarding and maintenance.
Accessibility	Access is provided free of charge to public institutions, research centers, and can be accessed by SMEs as well.

Infrastructure Performance: Assessment by Key Criteria

The table above outlines the key performance criteria of Serbia's AI infrastructure, evaluating its ability to support users across sectors based on four essential factors: speed, scalability, reliability, and accessibility. In terms of speed, Serbia's current infrastructure includes four NVIDIA DGX-A100 systems, each equipped with advanced GPUs capable of performing petaflop-scale computations. This level of computing power is suitable for training large-scale machine learning and deep learning models. Regarding scalability, the system is designed with future growth in mind. The infrastructure is modular, meaning new units can be integrated without major restructuring. A new supercomputer is planned and is expected to multiply Serbia's total AI computing power. This will ensure that the growing demand from research, government, and the private sector can be met effectively. The reliability of the infrastructure is ensured by its placement in a Tier IV data center—one of the highest-rated standards for data center performance. This guarantees a high level of redundancy, fault tolerance, and uptime. Finally, accessibility remains one of Serbia's strongest features. The national AI platform is open and free of charge to key stakeholders. Currently, more than 60 institutions benefit from this access, which encourages the broader adoption of AI technologies and fosters inclusive digital transformation.

Despite these strengths, several limitations and gaps persist, which could hinder the broader adoption and impact of AI in Serbia. The main challenges are listed below.

Uneven access to infrastructure across the country

While institutions in major cities can readily access the National AI Platform, those in rural or remote areas may face difficulties due to limited bandwidth or inadequate local support. Additionally, although the central computing system is powerful, there is a lack of regional or edge computing nodes that would allow for decentralized AI operations and faster local data processing, an essential component for applications in smart cities, healthcare diagnostics, and other real-time systems.

Limited availability of integrated tools and services that support the full lifecycle of AI development

While the infrastructure provides raw computing power, tools for streamlined model development, deployment, monitoring, and scaling (such as MLOps platforms, automated pipelines, and API integration services) are still underdeveloped. This makes it difficult for SMEs, which may lack dedicated AI teams, to move from prototype to production efficiently.

The shortage of skilled personnel

High-performance computing environments like DGX systems require specialized knowledge in system administration, AI model training, and DevOps. Many institutions, especially outside the major urban centers, do not currently have the human capital necessary to fully utilize the available infrastructure. This gap underscores the need for continued investment in capacity-building initiatives and technical training programs.

Connectivity and data governance

High-speed telecom infrastructure is not yet universally available across Serbia, limiting the efficiency of AI applications and data-intensive collaborations. Furthermore, the lack of standardized data governance practices makes it difficult to manage, share, and utilize data across different institutions, particularly in sectors where data privacy and GDPR compliance are of high importance.

5.2.3. Analysis of the needs of SMEs and public administration:

The digital transformation of Serbia's economy and public sector depends on the ability of SMEs and government institutions to adopt and effectively utilize AI. While investment has been made in infrastructure and strategic planning, a clear gap remains between the availability of technology and its practical implementation across sectors. This section draws on multiple sources, including the national AI strategy and ICT Hub's recent survey-based research, to provide a detailed analysis of the current state, challenges, and priority needs of these stakeholders.

AI Readiness in SMEs

According to the 2024 ICT Hub report on the use of AI in Serbian companies, AI implementation among SMEs remains limited, with only 34% of surveyed businesses having experimented with or adopted AI technologies. The majority of AI users are concentrated in the IT, finance, and business services sectors, which typically already have higher levels of digital maturity. In contrast, traditional sectors such as manufacturing, logistics, and agriculture demonstrate relatively low adoption rates, highlighting a digital divide between knowledge-based industries and production-driven enterprises.

The likelihood of AI adoption increases with company size. Enterprises with annual revenues above €40 million and large employee bases are more likely to have dedicated AI strategies, while smaller companies—especially micro-enterprises—lack the resources and expertise to do so. This imbalance reflects broader structural issues related to digital literacy, awareness of AI potential, and access to skilled personnel.

One of the most cited barriers is the lack of internal capacity. Even among companies that express interest in AI, many report not having staff with the technical or managerial skills to initiate and manage AI projects. Integration into existing digital ecosystems, particularly customer relationship management (CRM) and enterprise resource planning (ERP) systems, is also a significant hurdle. A large number of SMEs rely on legacy IT setups, which complicates efforts to connect AI modules and extract value from internal data.

Additionally, SMEs often do not perceive AI as directly relevant to their current operations. In the ICT Hub study, only 10% of surveyed companies recognized the significance that AI technology has for their business.

Public Administration and Digital Maturity

Serbia's public administration has made progress in digitization over the past decade. Numerous services have been moved online through the national eGovernment platform, and projects such as the central citizen registry, digital classroom initiatives, and healthcare data digitization have laid important groundwork. Nonetheless, the integration of AI technologies within public administration is still largely confined to small-scale pilots and individual initiatives.

Some steps are being made in the direction of creating digital assistants (chatbots) for local administration (Sombor and Šabac), which provide faster answers and save time and money for citizens. Other initiatives include employing AI to enhance electricity demand forecasting and predictive maintenance (Electric Power Industry of Serbia) and AI for risk detection of personal income tax evasion (Novi Sad

local tax administration), as well as using virtual assistants for standardized admin tasks and info access (multiple municipalities).

Key constraints in public administration include fragmented IT infrastructure, varying levels of digital competence across institutions, and difficulties in accessing or sharing data between ministries, municipalities, and institutions. Although the infrastructure provided by the National AI Platform is available to public institutions, usage is uneven. Furthermore, the lack of standardized policies around data interoperability hinders cross-sectoral collaboration and large-scale implementation.

Training gaps are also evident. Many public administration workers remain unfamiliar with even the basic capabilities of AI tools. There is a growing need to train users not only in how to use AI tools but also how to interpret AI-generated outputs, assess risk, and integrate insights into their daily workflows.

Both SMEs and public institutions face similar challenges when it comes to AI implementation:

1. Skills and Human Capital: A lack of AI literacy and a shortage of data scientists, machine learning engineers, and IT professionals capable of integrating and scaling AI solutions is a shared concern.
2. Data Access and Quality: Effective AI depends on structured, high-quality data. Yet SMEs typically have fragmented data storage systems, while public institutions face legal and procedural barriers to data sharing. As a result, both sectors struggle to acquire the data volume and integrity needed to build or fine-tune models.
3. Integration into Operational Systems: Whether it is integrating predictive tools into logistics platforms or embedding AI assistants into administrative workflows, the technical complexity of connecting new tools to existing systems is often underestimated and under-resourced.
4. Cost and Perceived Risk: Although cost is not the top barrier for organizations already exploring AI, it remains significant for those with limited resources. Additionally, uncertainty about ROI, fear of operational disruption, and lack of external support discourage experimentation.

Moving Forward: Identifying Needs

To improve AI adoption in Serbia's economic and administrative systems, the following needs should be addressed:

- Broad-based Training and Awareness Campaigns: These should go beyond technical skills to include AI management, regulatory considerations, and strategic planning. Training should be tailored to different levels—from top management to operational staff.
- Regional Access to Infrastructure: Initiatives such as regional AI hubs or training units could help bridge the geographic divide in AI readiness.
- Sector-specific AI Toolkits: Developing pre-configured AI solutions for key industries (e.g., manufacturing, logistics, agriculture, and public health) could lower barriers to entry and provide immediate value.

While infrastructure and strategic vision exist, a concerted effort should now be made to align Serbia's human capital, institutional frameworks, and digital culture with the opportunities AI can provide. By addressing these gaps, Serbia can ensure that AI becomes a driver of inclusive and sustainable transformation across all levels of society.

5.2.4. Assessment of AI tool applicability:

The applicability of AI tools within Serbia's SMEs and public administration depends not only on the technical performance of the tools themselves but also on the broader context in which they are deployed, such as digital maturity, data availability, infrastructure, and institutional readiness. While Serbia has invested in high-performance infrastructure and strategic initiatives (e.g., the National AI Strategy 2025–2030), there remain differences between potential and actual applicability, particularly at the level of operational integration and usability.

Applicability in SMEs

Among SMEs, the general applicability of AI tools is constrained less by the availability of tools than by the challenges of integration, scalability, and skills. For companies already familiar with digital processes, especially those in IT, finance, and professional services, AI tools such as customer segmentation algorithms, recommendation systems, and AI-assisted analytics platforms (e.g., Microsoft Copilot, ChatGPT, or Google Vertex AI) are often directly usable. These tools allow smaller businesses to automate reporting, enhance customer engagement, and streamline operations with relatively low investment.

However, in production-based sectors like manufacturing and agriculture, where digitalization itself is still progressing, AI applicability is limited. Many companies operate on legacy systems that are not interoperable with modern AI platforms. Additionally, a substantial number of SMEs either lack structured data or do not understand how to leverage the data they do have for training or using AI models.

Another challenge is the interpretability of AI tools. Even when basic models are deployed (e.g., demand forecasting or document automation), companies have difficulty understanding the output, adapting the model, or identifying clear business impact, especially when tools lack Serbian-language interfaces or context-aware training materials. This reduces both trust and perceived value.

Applicability in Public Administration

In the public sector, AI applicability is similarly mixed. Tools that support digitization, such as natural language processing for document classification, automated form processing, chatbot-based citizen engagement, or anonymization for GDPR compliance, are potentially highly impactful.

Nonetheless, large-scale rollout is hampered by fragmented IT systems and chains of responsibility between ministries, municipalities, and institutions. Even when AI tools exist, they are not widely adopted due to limited interdepartmental coordination and technical know-how.

In many cases, AI tools must be customized or retrained to be locally relevant, for example, adapting language models to Serbian administrative terminology or aligning data classification systems with local taxonomies. This requires resources and technical talent that are not uniformly distributed across the public sector.

The following table shows aspects of AI tools and their strengths and limitations.

Aspect	Opportunities	Limitations
Adaptability to local context	Many tools are open-source (e.g., Hugging Face, Scikit-learn), allowing fine-tuning and localization.	Lack of Serbian-specific datasets and language models.
Ease of use	No-code tools (e.g., Google AutoML, Azure ML Studio) are available and usable with minimal training.	Requires basic digital literacy and data preparation; adoption is slow in less digitized sectors.
Cost-efficiency	Free and premium models and open access to national infrastructure reduce barriers.	Hidden costs in training, integration, and maintenance.
Data compatibility	Structured data in public records and large private firms is usable for AI training.	SMEs and many public offices lack organized, clean, and labeled data; privacy regulations add layers of complexity.
Scalability	Cloud platforms and Serbia's national computing infrastructure offer room for scale.	Interfacing the cloud with local tools and secure networks remains difficult for many institutions.

Adaptability, Opportunities and Limitations

Despite the potential of AI tools, several challenges affect their applicability in both SMEs and public institutions in Serbia:

1. Lack of high-quality, accessible data: Many AI tools rely on historical, structured, and domain-specific data. In both public administration and SMEs, data is either unavailable, inconsistent, or not machine-readable. The absence of data lakes, common data standards, and cross-institutional access further magnifies this issue.
2. High technical complexity: Even tools labeled as user-friendly often require a solid understanding of data preprocessing, model interpretation, and ethical implications. Without internal AI teams or external consultants, most institutions cannot effectively deploy these tools.
3. Costs of implementation and maintenance: While many tools are free or affordable at the outset, full implementation requires investment in training, infrastructure integration, and long-term support. These ongoing costs are often underestimated.
4. Language and cultural adaptation: Most mainstream AI tools are built for English-speaking or global markets. Serbian-language support is still weak, especially in tools for sentiment analysis, document summarization, or speech-to-text systems.

AI tools have significant potential to support digital transformation in Serbia's public and private sectors, particularly through automation, improved decision-making, and increased productivity. However, the real-world applicability of these tools is uneven and closely tied to the specific context in which they are deployed. For AI to be broadly effective, it must be supported by upskilling of users, strategic alignment with operational goals, and continued development of Serbian-language and domain-specific models. While the foundation is strong, thanks to national infrastructure and institutional support, addressing the challenges of data quality, technical complexity, and cross-sector collaboration will be key to unlocking the full value of AI tools in Serbia.

5.2.5. Recommendations for the use of AI tools:

To accelerate the digital transformation of Serbia's economy and governance systems, it is essential to develop and implement a set of targeted, practical, and context-specific recommendations for the use of AI tools. These recommendations need to align with Serbia's strategic priorities, as set out in the National AI Strategy 2025–2030, and also need to be grounded in the operational realities of SMEs and public administration.

First, the development of sector-specific AI toolkits should be prioritized. Many SMEs and public institutions remain unsure of how AI tools can be practically applied in their specific environments. Creating pre-configured, use-case-oriented solutions, tailored for industries such as manufacturing, logistics, agriculture, and healthcare, would help lower the barrier to entry. These toolkits should be localized, with interfaces and documentation in Serbian, and include case studies that demonstrate tangible benefits and return on investment.

For SMEs and public offices that lack the capacity to host or develop AI tools independently, the promotion of AI-as-a-service (AIaaS) models is particularly important. Cloud-based platforms and open-source tools can be made more accessible through digital hubs and partnerships with research institutions. By supporting shared access models and subsidized service plans, smaller organizations could experiment with and adopt AI without the burden of major upfront investments.

Equally important is the establishment of a national AI skills and certification framework. A modular training program, offered online and in-person, should be designed for different audiences, including business owners, public managers, and technical staff. In addition to technical training, emphasis should be placed on ethical AI use, regulatory compliance, and strategic decision-making. Prompt engineering, the use of foundational tools like ChatGPT or Microsoft Copilot, and applied case analysis should form part of the standard curriculum.

Data quality and availability continue to limit the effective use of AI in Serbia. As such, a coordinated effort must be made to improve data access and interoperability across the public and private sectors. Public institutions should be supported in adopting common data standards, and data readiness audits could help identify areas for immediate improvement. To protect privacy while supporting innovation, GDPR-compliant solutions should be adopted more widely. Additionally, open, anonymized datasets should be curated and made available in domains where AI applications could bring high public value.

Geographic equity must also be addressed through stronger regional support structures. AI adoption is currently concentrated in Belgrade and a few other tech hubs, leaving much of the country underrepresented in the digital economy. The expansion of regional AI centers, especially linked to S4AI_Hub, could provide hands-on access to training, mentorship, and testing environments. These centers would help bridge the gap between national infrastructure and local implementation needs.

Finally, funding bodies should support projects that demonstrate the value of AI in practical, scalable ways. Competitive calls for proposals targeting SMEs and public institutions could accelerate experimentation and lead to broader adoption. Projects should be chosen not only for their technological innovation but also for their potential to improve citizen services, enhance transparency, or strengthen economic resilience.

The successful use of AI tools in Serbia will depend not only on access to infrastructure but also on training, collaboration, and contextual adaptation. By implementing these recommendations, Serbia can turn its AI potential into measurable, inclusive progress, creating added value for institutions, businesses, and citizens alike.

5.3. Monetization of startup solutions in traditional industries

5.3.1. Market analysis and potential for startups

State of traditional industry in Serbia and analysis of their needs for innovative solutions

Traditional industries in Serbia, including manufacturing, textile, construction, metal processing, and others, form the backbone of the domestic economy, but are simultaneously among the least digitized sectors. A particularly concerning finding comes from ICT Hub's recent research on the application of artificial intelligence in companies in Serbia, which shows that AI application in the manufacturing industry is "extremely low," although this is precisely where one of the greatest potentials for improving efficiency, predictability, and quality lies.

Limited AI integration in these sectors results from a series of factors, from lack of internal digital infrastructure and quality data, to low levels of knowledge and trust in new solutions. It is interesting that, although more than a third of companies in Serbia express readiness to experiment with AI, the main reason why many don't do it is not lack of funds, but, as the research shows, the absence of a clear strategic approach to innovation. This clearly indicates the need for external actors, including startups, who can help companies identify relevant solutions and test them under controlled conditions.

Within the SME Hub project (a project launched in 2023 in partnership between the Swiss Agency for Development and Cooperation and ICT Hub) through workshops, field work, diagnostics, and financial support for more than 60 small and medium enterprises from industries such as chemical, electronics, rubber, plastics, metal processing, wood, textile, and food, a clear conclusion was reached: traditional companies in Serbia significantly lag in digitalization and rarely show initiative toward technological innovation. Many organizations lack basic understanding of digital tools nor feel urgency for their adoption, while capacities for cooperation with startups practically don't exist. The exception is only the largest corporations that recognize innovative work models and integration of startup solutions. This gap between traditional SMEs and the innovation ecosystem is confirmed by international OECD reports that emphasize that small and medium enterprises lag in digital transition due to lack of managerial skills, technical knowledge, and resistance to change. SME Hub precisely through identification of these challenges launched initiatives for connecting traditional industries with startups, with strategic support from corporations, with the goal of accelerating digital transformation and establishing sustainable cooperation through joint projects and integration of innovative solutions.

Within the SME Hub project, as well as through interviews conducted during various research efforts, the most pronounced challenges were identified: inefficient production processes, high operational costs, losses in the supply chain, and difficulties in capacity planning. Additionally, challenges related to equipment maintenance, quality control, and human resource management are present. These are all areas where there is a clear need for innovations that can come from outside, especially from the startup ecosystem.

Analyses show that even in companies that express motivation for improvement, concrete strategies and tools to actually implement innovations are lacking. Startups can fill this gap by offering "plug-and-play"

solutions that solve specific problems without the need for major reorganizations. However, for efficient synergy to occur, it is necessary to map specific industrial needs and connect them with startups, which requires intersectoral coordination.

Analysis of current needs for innovation: digitalization, automation, process optimization

The most pronounced needs of traditional companies are related to improving basic business functions: process management, production equipment maintenance, procurement planning, and performance analysis. Research on the Application of Artificial Intelligence in Companies in Serbia shows that most companies already applying this technology use it precisely for decision optimization and sales increase, which confirms its direct connection to economic benefits. However, the key obstacle remains integration into existing systems. More than a third of companies that tried introducing AI faced serious challenges, especially regarding integration with existing CRM, ERP, and SCM systems.

Additionally, more than 60% of companies use only one type of AI solution, most commonly machine learning. This indicates an initial phase of application maturity -- simpler AI products that target one function (e.g., marketing or customer support) dominate, while more complex systems that include multiple functions are still rare.

These findings should be viewed as a call for startups: there is a clearly expressed need for solutions that enable simpler integration, targeted automation, and concrete value. However, for long-term sustainability, parallel client education and preparation for systematic technology introduction are necessary, which is especially important for companies that still don't have capacities for deep technological transformations.

In most traditional industries in Serbia, there is consensus that digitalization is necessary, but methods and priorities differ. Based on insights from SME Hub, the most frequently expressed needs include:

- Digitalization of basic business functions: inventory management, accounting systems, CRM and HR tools are still rare among most small and medium companies.
- Automation of repetitive processes: manual data entry, tracking production flows, or physical quality inspection represent tasks suitable for automation through software or hardware solutions.
- Production and logistics optimization: companies increasingly seek ways to reduce losses in the value chain, predict machine failures, or more precisely plan raw material consumption.

Technological interventions that have proven particularly relevant include the use of IoT sensors for production line monitoring, application of AI tools for predictive maintenance, as well as use of software platforms for production management (MES) and real-time data analysis. In agriculture, there is growing interest in agtech startups offering satellite monitoring, smart irrigation, and precise harvest planning.

However, the biggest challenge is not technological in nature, but in the process of how to identify a solution that is mature enough to be implemented, while simultaneously adapted to the level of digital

literacy in companies. Therefore, startups offering scalable and adaptable solutions have a clear advantage.

Identification of areas where startups can offer innovative solutions and analysis of market trends

Based on research, areas with the greatest untapped potential include: production automation, business analytics, customer relations, and resource management. Among companies ready to engage in AI projects (30% of them), interests are evenly distributed across precisely these functions, without clear focus, indicating that unarticulated demand still exists.

Startups developing solutions based on AI, IoT, or data analytics have the potential to offer quality solutions for industries currently not using advanced technologies. However, their greatest opportunity lies in gradual integration: "phased adoption" models that allow companies to test AI in limited scope, with low initial risk and cost.

Additionally, research reveals that cooperation with startups and external experts in the AI field already exists in more than half of companies using AI, but cooperation with startups is still marginal compared to cooperation with consultants. This opens space for organized connection and structured presentation of value that startups can bring, not only as suppliers, but as development partners.

In this context, the Startup Scanner 2025 report further illuminates the supply from the startup ecosystem itself. The largest number of startups that participated in the research comes from the BioTech/MedTech sector (16.2%), immediately followed by AgriTech and FoodTech sectors with 12.1%, which shows potential for innovation precisely in areas that are part of traditional Serbian industry. This data indicates existing interest of domestic startups in sectors with physical production, thereby establishing a strategic connection between market demand and potential supply.

Even more significantly, Startup Scanner 2025 records a significant increase in the representation of AI technology use among startups -- a growth of 14.2% compared to 2022. Artificial intelligence, databases, and big data management are highlighted as key technological drivers of innovation, reflecting the global trend of "data-driven" innovations and confirmed through the growth of global investments in AI companies (growth of over 80% in 2024 according to Crunchbase data).

It is also interesting that, besides software focus, the startup scene still records hardware development presence, although in slight decline (18.2% in 2025 versus 21.9% in 2023). This means there is also an engineering base capable of responding to needs for physical solution integration, which is especially relevant for sectors such as agriculture, logistics, food, or textile industry.

Market trends and strategic insights from research indicate clear potential, but also necessity: for wider use of AI and other technologies in traditional industry, startups will be crucial -- those who understand sector specificities, can work iteratively, and have capacity to gradually scale their solution in complex organizational environments.

In the context of Serbian economy, several areas stand out as particularly suitable for startup intervention:

- Internet of Things (IoT): especially in sectors with physical production and equipment, e.g., smart machines in wood and textile industry, sensor monitoring of cold chain in food industry, etc.
- Artificial Intelligence (AI): predictive analysis for equipment maintenance, energy consumption optimization, and algorithmic capacity planning are already in focus of early pioneers.
- Data analytics and business intelligence tools: to extract value from data that already exists in companies but is not structured or analyzed.
- Digital platforms and software tools: simple tools for process management, internal communication, e-procurement, or remote inspection of products or services.

From the perspective of market trends, three key directions are identified:

1. Sustainability and energy efficiency -- due to regulatory and cost pressures, companies are more open to solutions that enable consumption reduction and resource optimization.
2. Safety and quality control -- especially in food and pharmaceutical industry, where there is growing need for quality control and supply chain transparency.
3. Flexible production -- due to unstable market conditions, interest in tools that enable quick organization of production processes or work tasks is growing.

5.3.2. Analysis of challenges that startups face when selling their solutions

Startups are key innovation carriers and often develop products that can transform the way traditional industries work. However, in practice, it turns out that selling solutions to traditional companies is often a long-term, complex, and exhausting process. Despite increasing interest in digital transformation, traditional companies still express a series of operational, organizational, and cultural barriers that make successful placement of startup products difficult.

This analysis illuminates the most common obstacles that startups face, relying on concrete insights from the Western Balkans region, especially Serbia, and finds confirmation both in the documented research report by EBRD and in practical work of projects such as SME Hub. Through work with more than 60 SMEs in Serbia, SME Hub showed that companies often need prior examples and case studies or peer-to-peer recommendations from someone in business they trust, in order to even consider innovation. Also, even when motivation exists, companies often lack resources for implementation, which is why initiatives that include grants, mentorship, and facilitation of dialogue with startups have shown the most success.

It is particularly significant that cooperation is more easily achieved when large corporations are also in the chain. They serve as a "pull factor" for SMEs to join digital innovations. This dynamic indicates the

need for a systemic approach that includes different levels of business hierarchy and creation of a support ecosystem.

Additionally, research conducted within the "Cooperation between corporations and startups in the Western Balkans" program shows that cooperation success is significantly higher when there is a clearly defined framework of expectations, when roles are precisely divided, and when there is a mechanism for continuous monitoring and evaluation of results. However, practice shows that these conditions are rarely met spontaneously, but require conscious efforts and structured approaches from all involved parties.

5.3.2.1. Detailed overview of key challenges

5.3.2.1.1. Organizational barriers in traditional companies

Absence of dedicated team or strategy for innovation

Traditional industries most often lack structures that would accept and test startup solutions. According to the report "Cooperation between corporations and startups in Serbia," supported by the EBRD Star Venture program, it is stated that only 1 out of 3 corporations has a strategy or mechanism for working with startups. For SMEs and production companies, this figure is even lower -- less than 15% have any formal approach to innovation. This means that without strategy, cooperation is ad hoc, led by personal initiatives and without institutional support.

This situation is further complicated by the fact that traditional companies often don't have even basic processes for innovation evaluation. There are no clear criteria for assessing potential benefits, no defined budgets for pilot projects, and often no responsible persons who could make quick decisions about testing new solutions. In practice, this means that even when a startup presents an obviously useful solution, the company must improvise the entire evaluation and decision-making process, which significantly slows down or completely blocks potential cooperation.

A special problem is that innovations are often treated as an "addition" to basic business, not as a strategic need. This means that when cost pressure or time constraints occur, projects with startups are the first to be postponed or cancelled.

Unfamiliarity with startup market and digital solutions

Many companies don't know what to expect from startups, how to evaluate technological offers, and how to implement them. As previously mentioned, SME Hub's experience confirms that SMEs often lack even basic digital literacy -- over 70% of supported SMEs have never used ERP, CRM, or BI software, and lack of understanding of more complex solutions like IoT or AI systems certainly prevents integration and testing of more advanced solutions.

This lack of digital competencies manifests at multiple levels. First, management often doesn't understand basic concepts of digital technologies, making communication with startups difficult from the start. Second, employees don't have necessary skills for working with new tools, requiring additional

investments in training. Third, the company often lacks infrastructure needed for digital solution implementation.

Additionally, traditional companies often lack understanding of the iterative approach to product development that is characteristic of startups. They expect final, completely finished products, while startups work on the concept of continuous improvements and adaptation based on user feedback. This fundamental misunderstanding often leads to frustrations on both sides.

Slow decision-making and complex internal processes

Startups in surveys most often cite "lack of response and follow-up" and "complex internal procedures in companies" as obstacles. Public procurement processes, legal evaluations, or technical testing can last for months. In traditional companies, the decision to purchase new software or technological solution often must go through multiple hierarchical levels, including technical evaluation, financial analysis, legal review, and final approval by top management.

This complex decision-making process is often a consequence of organizational culture that prioritizes safety over innovation. Each hierarchical level adds its layer of verification and control, prolonging the process and often leading to loss of initial momentum for change. Additionally, in traditional companies there is often an unwritten rule that it's "safer" not to make a decision than to make a wrong decision, further slowing the process.

A particularly problematic scenario is when different sectors have different priorities and interests. For example, the IT sector may be enthusiastic about a new solution, but the financial sector may be defensive due to costs, while operational managers may fear disruptions in existing processes.

5.3.2.1.2. Cultural and communication barriers

Unclear expectations and undefined roles

Both sides often don't share the same idea about what the cooperation goal is. About 30% of startups cite "misaligned expectations" as the main reason for failure, while companies emphasize "unclear ROI" -- uncertainty regarding return on investment, both financial and investment of time and human resources, preventing SMEs from engaging in cooperation.

This misalignment of expectations often arises from different approaches to defining success. Startups usually measure success through user adoption, functionality improvement, or strategic partnerships, while traditional companies focus on direct financial indicators such as cost reduction or revenue increase. Without clear agreement on these different perspectives at the beginning of cooperation, it's almost inevitable that disappointment will occur.

Additionally, the problem is that startups often overestimate the speed of traditional companies' adaptation to new technologies. They expect clients to quickly accept and actively use new solutions,

while in practice traditional companies need months to integrate new solutions into their existing processes. On the other hand, traditional companies often overestimate the maturity of startup solutions and expect a level of support and stability characteristic of established technology suppliers.

Distrust toward new or young companies

In traditional sectors, a "low-risk" mentality dominates. There is pronounced skepticism toward risky technologies and young companies without proven results. Even if the solution is better and cheaper -- it's safer for companies to continue with existing suppliers. Traditional companies usually place a high degree of trust in suppliers, or rely on those they know. Startups are often new and unverified, so building trust with them is difficult.

This problem is especially pronounced in the B2B sector where decisions are made based on long-term business relationships and reputation. Traditional suppliers have the advantage of established relationships, known references, and long-term cooperation history. Startups, on the other hand, don't have these characteristics.

Distrust also relates to startups' financial stability. Traditional companies fear that a startup will fail before completing the project or won't be able to provide long-term support. This concern is justified, given the high failure rate among startups, but often becomes an insurmountable barrier regardless of the quality of the offered solution.

The cultural aspect of this problem is another important factor. In Serbia, business decisions are often made based on personal recommendations and networks of acquaintances. Startups, as new actors, often don't have access to these networks and must invest significant time and energy in building trust and reputation.

Undefined terms and acronyms

Startups use technical jargon (API, IoT, big data, MVP), while business managers in traditional industries talk about ROI, CAPEX, operational costs. This creates a barrier to understanding, often making efficient communication and decision-making difficult. Terminology like "pilot" often implies an initial phase for a startup, while companies expect a final solution. Such misaligned communication leads to frustrations on both sides -- the startup considers the solution tested, the company considers it not fully functional.

The problem is further complicated when considering that different industries have their specific jargon. A startup working with food industry companies must learn terminology related to HACCP standards, GMP practices, and food regulations, while a startup working with logistics companies must understand terms like "just-in-time delivery," "supply chain optimization," and "last-mile logistics."

Speed and agility vs. stability and procedure

Startups function quickly and agilely, it happens that they are flexible with working hours, don't have established procedures and protocols, which can instill distrust in decision-makers from industry because this is not the way of working they are accustomed to. SMEs often have long procedures and chains of

command that must be respected, and all this takes time and can be very complex, especially for someone entering from outside. Startups must navigate through these structures, often without help or clear contacts. This different work dynamic often leads to misunderstandings and deadline violations.

Startup culture is focused on speed of decision-making, experimentation, and accepting mistakes as part of the learning process. Traditional companies, on the other hand, value predictability, systematicity, and risk minimization. This fundamental difference in approach can lead to frustrations when a startup doesn't adhere to formal communication procedures or when a traditional company insists on extensive documentation before making any decision.

Additionally, startups often work with limited resources and must quickly respond to market changes. This means they can change priorities, pivot their products, or restructure the team in a short time period. Traditional companies, which plan annual budgets and strategies, may feel insecure when a partner frequently changes direction.

Formality in communication

Startups often prefer direct, informal digital channels (Slack, Zoom) and use digital tools for work (cloud workspace), while SME representatives prefer phone calls and live meetings, and documentation is often, at least partially, in paper form. This leads to misaligned expectations regarding responsibility and documentation.

This gap in communication preferences also reflects different generational approaches to work. Startups are often led by younger entrepreneurs who were raised in a digital environment, while traditional companies are often led by more experienced managers accustomed to more formal business communication.

The problem also arises in documenting agreements and decisions. Startups often work with informal agreements kept in digital tools such as shared documents or project management platforms. Traditional companies expect formal contracts, meeting minutes, and written correspondence that can be archived and used as a basis for future decisions.

Purchase model vs. testing model

For a startup, pilot means learning, while the company wants to buy a finished product. Startups seek space for iteration and learning, while industry wants ready solutions that bring exact, quantified ROI and can be implemented immediately in their final version. This mismatch is a frequent reason for abandoning cooperation.

Traditional companies are accustomed to a model where they buy finished products or services with clearly defined functionalities, prices, and support conditions. Startups, on the other hand, often offer solutions that are still in development and seek partners willing to participate in the product improvement process.

This "co-creation" model can be very useful for both sides -- the startup gets valuable feedback and real testing conditions, while the traditional company can influence the development of a solution that will best meet its needs. However, this model requires traditional companies to accept the role of early adopters and be prepared for a certain level of uncertainty and experimentation.

5.3.2.1.3. Economic and financial barriers

High initial implementation costs

Innovative solutions (ERP systems, IoT sensors, AI tools, software) often require investments in infrastructure (servers, employee training, process adaptation). Many traditional companies operate with minimal operational margins and don't have even basic IT capacities, so even pilot projects are perceived as too big a risk. Also, most traditional SMEs don't have human resources they can just separate to deal with integration of innovative solutions, so this is another barrier.

This problem is especially pronounced in Serbia where many SME companies still work with outdated equipment and don't have budgets for significant technological investments. Even when a startup offers relatively cheap solutions, total implementation costs -- including training, integration with existing systems, and possible work stoppages -- can be demotivating for small companies.

Additionally, traditional companies often don't understand the cost model that startups use. Subscription models, pay-per-use prices, or revenue sharing arrangements can be confusing for companies accustomed to one-time purchases or traditional leasing arrangements.

The problem is further complicated by the fact that many startup solutions require significant changes in business processes. This means implementation costs don't include only technological investments, but also reorganization costs, employee training, and possible productivity losses during the adaptation period.

Lack of budget for innovation

Many traditional companies don't have specific budget lines for testing startup solutions, nor annual goals that include integration and application of innovations. SME Hub notes that grants in this context are the only way to test innovation without financial risk for SMEs. According to the EBRD report, companies "express interest in cooperation, but their internal ability to support pilot or integration is limited."

This lack of innovation budget is often a consequence of short-term planning and focus on immediate operational needs. Traditional companies often work with tight budgets where every expense must be justified through direct benefits. Innovations, which by nature carry a certain level of uncertainty, hardly fit into such a budgeting approach.

Additionally, many companies don't have internal processes for evaluating ROI of innovative solutions. While it's easy to calculate return on investment for purchasing a new machine or capacity expansion,

it's much harder to quantify benefits from digital solutions that can improve efficiency, reduce errors, or enable better decision-making.

Risk of failure and investment loss

In traditional management culture, especially among SMEs, risk aversion dominates. A new supplier, especially a startup, is often seen as an unsafe investment. There's no security that a pilot project will transition to regular use, so companies seek proven references and guarantees that startups often can't provide.

Startups, on the other hand, often can't provide the same levels of security. They don't have years of work history, may not have significant financial reserves for problem cases, and often work with innovative technologies that by nature carry higher risk of failure.

Expectation of free pilot projects

Startups often enter pilot phases without compensation, leading to resource exhaustion without scaling guarantee. The EBRD report states that lack of follow-up and concrete results after pilots is a frequent reason for frustration.

This problem is especially pronounced because traditional companies often don't understand the value of time and work that startups invest in adapting their solutions to specific client needs. They see pilots as free product testing, while startups see it as investment in future cooperation.

Additionally, many companies use pilot projects as a way to "get by cheaply" through the digitalization process without real intention to continue cooperation. They can organize multiple pilot projects with different startups and end up not choosing any, leaving startups without compensation for invested work.

5.3.2.1.4. Technical and operational barriers

Mismatched level of solution maturity and company capacities

In many cases, startups offer advanced solutions (e.g., IoT monitoring in production), but companies don't have even basic IT systems to integrate them. This creates a gap in application possibilities, especially in sectors such as food, textile, and wood industry.

This technological gap is often a consequence of uneven digitalization development in the region. While some sectors (such as finance or telecommunications) are relatively advanced in adopting new technologies, traditional production sectors often lag behind by several years.

The problem is further complicated by the fact that startups often develop solutions with advanced clients in mind and may not consider the needs of traditional industries. They may assume the existence of certain IT infrastructure or digital competencies that simply don't exist in some companies.

Incompatibility with existing systems

Even when companies have some IT systems, they are often not compatible with modern startup solutions. Outdated ERP systems, legacy databases, and proprietary software can be significant barriers to new solution integration.

Startups often develop their solutions using modern technologies and standards, while traditional companies may use software that is decades old. Creating bridges between these systems can be technically complex and expensive.

Lack of internal competencies for change management

Implementation of new technological solutions requires change management skills that many traditional companies lack. This includes data migration planning, employee training, business process adaptation, and change management during the transition period.

Traditional companies often don't have experience with such complex projects and don't know how to minimize risks and ensure smooth transition. This can lead to extended implementation periods, budget overruns, and employee dissatisfaction.

5.3.2.1.5. Regulatory barriers

Outdated regulations that don't recognize digital solutions

Digital contract signing, automatic invoicing, use of cloud solutions in healthcare and financial sector are still unclearly defined in law. Startups offering fintech, healthtech, or proptech solutions often encounter legal ambiguities that discourage both them and their potential clients.

This regulatory uncertainty is especially problematic because traditional companies are usually very conservative when it comes to compliance. They would rather not implement a new solution than risk regulation violations or legal uncertainty.

The problem is further complicated by the fact that regulations often change slower than technology develops. Legal frameworks written before the emergence of cloud computing, artificial intelligence, or blockchain technologies often don't provide clear guidelines for their use.

Complexity of introducing new digital tools in supervised sectors

In sectors such as healthcare, education, or utilities, implementation of software and data-driven solutions must go through public procurement procedures and certification, which is often unfeasible for startups and SMEs.

Public procurement procedures are especially problematic because they are designed for traditional products and services, not innovative technological solutions. They require detailed specifications, proven references, and often the lowest price as the main criterion.

Additionally, many certification processes require significant financial investments and can last for years. For startups working with limited resources, such requirements can be unfeasible.

Analysis of challenges in monetizing startup solutions in traditional SME companies in Serbia reveals a complex network of interconnected obstacles that directly threaten the financial sustainability of young technology enterprises. These challenges go beyond usual sales and marketing problems -- they represent fundamental barriers that prevent startups from transforming their innovations into profitable business models.

The key insight is that monetization problems are not a consequence of low quality startup solutions or lack of market need, but the result of systemic incompatibilities between startup business models and operational reality of traditional SME companies. Extended sales cycles, expectations of free pilot projects, unclear procurement processes, and risk aversion create an environment where even the highest quality solutions cannot achieve quick and predictable monetization.

5.3.3. Development of cooperation models between startups and traditional companies

Establishing efficient and sustainable cooperation models between startups and traditional industries is crucial for accelerating innovation and strengthening competitiveness in today's business environment. Cooperation brings complementary benefits: startups bring agility, innovative technologies, and fresh perspective on business challenges, while corporations and smaller companies provide market infrastructure, resources, and credibility.

Partnership models

There are multiple forms of cooperation that can be adapted to partner goals:

1. Joint development and strategic partnerships Long-term cooperations that involve co-creation of products or services. Such models involve clearly defined goals, budgets, and deadlines, and often bring the greatest impact on innovation capacities of both sides.
2. Innovation outsourcing (venture clienting) Corporations buy products/services from startups to solve specific challenges. This model enables quick solution testing and validation of startup market value.
3. Technology licensing and acquisitions Startups can license their solutions through licensing or become part of larger systems through acquisition, especially in cases of talent acquisition purchases, not just products.
4. Corporate investment funds (CVC) Direct corporate investments in startups enable insight into early innovations with strategic partnership and lower investment risk compared to classic acquisitions. In Serbia, there is a unique example of CVC called TS Ventures.

5. Support programs (incubators/accelerators) Structures that offer mentorship, resources, and market validation, most often in early startup development phases. Often include knowledge exchange, work with experts, and possibility of entering corporate distribution channels. One of the rare examples of this type of cooperation is the startup program Univerzum.
6. One-time events Hackathons, competitions, and pitch events represent initial forms of cooperation, useful for testing potential and building relationships, but rarely lead to deep integration.

Benefits of cooperation between startups and corporations

Partnerships between startups and corporations bring significant advantages for both sides, enabling them to use complementary capabilities and accelerate innovation. Startups bring agility, fresh ideas, and advanced technologies, while corporations provide resources, market access, and credibility. When well-structured, such partnerships have the potential to transform business models, organizational cultures, and market positions of both sides.

Benefits for corporations

1. Solving specific business challenges Cooperation with startups enables corporations to efficiently respond to specific operational or strategic challenges. Startups can offer ready solutions or develop new ones in a joint process, significantly shortening innovation introduction time.

2. Expanding offerings and markets Through distribution, licensing, or joint development of startup products, corporations can expand their product lines and enter new markets. This is especially important for companies seeking additional value outside their primary industry.

3. Encouraging innovative brand perception Partnership with startups can significantly contribute to corporation image as an innovative and progressive actor, having a positive effect on perception among clients, investors, and future employees.

4. Rejuvenating corporate culture In contact with startups, large companies can introduce more agile ways of working, openness to experimentation, and better understanding of new technologies and trends. This leads to greater organizational flexibility and adaptability.

5. Acquiring skills and technological capacities Corporations through partnerships gain access to talents, knowledge, and technologies they would hardly develop internally, long-term strengthening their innovation capacities and competitive position.

Benefits for startups

1. Access to resources Cooperation with corporations enables startups to gain access to financial, infrastructural, and expert resources that are often beyond their reach in early development phases. This includes laboratories, testing environments, business advisors, and technical experts.

2. Market entry One of the key advantages is access to existing sales channels and market platforms that corporations already possess. This accelerates product validation, increases sales, and reduces market entry costs.

3. Increasing credibility Association with established corporations brings reputational value: consumer trust increases, new investments are easier to obtain, and doors often open for additional partnerships with other major players.

4. Product development and testing Corporate environment provides structured space for product development and testing under real conditions. Through mentor support and domain experts, startups can more precisely adapt their solutions to market needs.

5. Scaling business model In partnership with large companies, startups have the opportunity to test "go-to-market" strategies, improve operational processes, and build sustainable business models, increasing the chance for long-term success.

Connection mechanisms: how to connect two worlds

Establishing contact between startups and traditional industries requires mediation, preparation, and structured meeting formats such as:

1. Matchmaking events Programs like Start Me Up, through 330 speed meetings and 24 thematic conversations, showed that direct interaction between representatives of both sides is crucial for initiating cooperation. In such events, directness, relevance, and quick feedback are valued.
2. Connection platforms Digital tools like OTP Connect enable structured presentation of challenges and solution applications from startups. These platforms reduce access barriers and enable scalable cooperation.
3. Pilot programs and corporation-led challenges Corporations increasingly launch challenges through which they invite startups to offer solutions for specific needs, enabling idea testing through controlled conditions and limited time, with scaling possibility if they prove successful. An example of a similar program in Serbia is A1 Partnering program.
4. Role of ecosystem support organizations Accelerators, funds, chambers, and innovation centers play a key role in facilitation, from finding relevant actors, through communication mediation, to preparing both sides for cooperation.

5.3.3.1. Recommendations for successful cooperation

Efficient cooperation between startups and corporations doesn't happen spontaneously -- it requires preparation, goal clarity, and organizational readiness. When both sides are aligned, partnerships can have transformative impact on their business models, innovation capacities, and market position.

For startups

- Clear definition of cooperation goal Startups should precisely formulate what they want to achieve through cooperation, whether it's solution validation, market access, joint product development, or other type of support. Clearly set goals help in shaping relevant proposals and direct communication with potential partners.
- Developing clear value proposition for corporations Corporations most often seek solutions that respond to specific business challenges. Therefore, it's important for startups to present their value in the context of benefits they can bring, whether through efficiency increase, new revenues, better user experience, or access to new markets.
- Professionalizing approach Trust and seriousness are built through professional approach, from clear solution presentation, through readiness for dialogue and adaptation, to transparent business operations and readiness for pilot projects.
- Using mediators and institutional mechanisms Startups should actively use accelerators, innovation centers, clusters, and digital connection platforms to more easily establish contact with relevant industry actors. Mediators can significantly facilitate the cooperation entry process.
- Readiness for iteration and adaptation Cooperation with large systems requires flexibility. Startups should be ready to adapt their solution to real corporation needs, learn during the process, and maintain continuity in communication.

For corporations and smaller companies

- Formulating strategy for working with startups Companies should develop a strategic framework for cooperation with external innovators, clearly defining priority areas, cooperation goals, and startup evaluation processes. Without this, cooperation remains fragmented and underutilized.
- Establishing internal teams and processes for innovation It's necessary to provide resources, people, and structures within the organization that will be dedicated to cooperation with startups. These teams take the role of mediators within the organization and guarantee cooperation continuity.
- Preparing organization for accepting external solutions For a startup solution to be successfully implemented, companies must prepare internal teams, processes, and culture for cooperation. Including end users, management, and IT sector in early phases increases the chance for successful integration.
- Openness to experimentation and failure Cooperation with startups implies a certain degree of uncertainty. Companies should treat pilot projects as learning space, not as final investment

decisions. A culture that tolerates failure encourages experimentation and accelerates innovation.

- ● Recognizing long-term benefits and investing in relationships Success doesn't happen overnight. Companies should invest in building trust, provide support through multiple development phases, and develop collaboration models that enable scaling of solutions if they prove successful.

When properly established, partnerships between startups and corporations are not just instruments for problem-solving, but become catalysts for strategic transformation and innovation resilience. In such a framework, both sides become agents of change through shared learning, mutual trust, and aligned vision of the future.

Collaboration between startups and traditional industries is not just a temporary trend, but a necessary step toward sustainable development and adaptation to a rapidly changing business environment. The key to success lies in structured models, mutual understanding, and openness to learning.

5.4. Strategic Mapping of Academic Laboratories for SME-Driven Innovation

5.4.1. Analysis of Availability and Utilization of Faculty Laboratories

5.4.1.1. Comprehensive Mapping of Faculty Laboratories

In Serbia, universities represent a foundational, though often underleveraged, component of the national innovation infrastructure. Across their faculties and research institutes, academic laboratories house a wide variety of specialized equipment, scientific knowledge, and highly trained personnel. These assets are especially relevant for supporting the digital transformation and technological advancement of small and medium-sized enterprises (SMEs), yet they are not always systematically catalogued or widely known beyond academic circles.

Laboratories across Serbia's academic institutions reflect a remarkable breadth of disciplines — from engineering, artificial intelligence, and robotics, to agriculture, biomedical sciences, environmental protection, and even the arts and humanities. Some labs are embedded in long-established departments with decades of research legacy, while others are more recently formed as part of innovation-driven entities such as Science and Technology Parks (STPs), Innovation Centers, and Digital Innovation Hubs (DIHs). These modern institutional structures create new pathways for practical, interdisciplinary problem-solving, especially for SMEs seeking support in prototype development, product validation, and technology consulting.

Despite this richness, a full national inventory of faculty laboratories — including their infrastructure, staffing, research focus, and openness to collaboration — has only recently begun to take shape. The eNauka platform now lists over 208 active research institutions, providing a crucial starting point for a structured mapping exercise. The accompanying table highlights a representative sample of laboratories with strategic relevance, drawn from both prominent and regional faculties. This mapping aims to identify not just well-known centers of excellence, but also overlooked institutions that, with appropriate support, could become key nodes in Serbia's innovation ecosystem.

5.4.1.2. Industry Engagement Assessment

Serbian universities show significant variation in the degree to which their laboratories engage with industry partners. While some faculties have well-established reputations for collaborating with companies, others operate in relative isolation from the private sector. Leading institutions such as the University of Belgrade's School of Electrical Engineering, Faculty of Mechanical Engineering, and Faculty of Technology and Metallurgy — along with the University of Novi Sad's Faculty of Technical Sciences and the University of Niš's Faculty of Electronic Engineering — are prime examples of how academic labs can directly support industrial needs. These institutions maintain active partnerships with IT companies, electronics manufacturers, and industrial automation firms, contributing to applied R&D, co-funded projects, and talent development.

Outside of the core engineering domains, faculties of Architecture, Civil Engineering, and Urban Planning (such as in Belgrade and Subotica) are notable for their contributions to infrastructure and sustainable

construction projects, often in cooperation with SMEs in the construction sector. Meanwhile, faculties specializing in agriculture, medicine, and creative industries — such as the University of Belgrade's Faculty of Pharmacy and the University of Arts — collaborate with stakeholders ranging from pharmaceutical companies and biotech startups to design firms and cultural entrepreneurs.

However, this engagement is uneven across the academic landscape. Many laboratories in smaller cities or in non-technical disciplines exhibit low levels of interaction with industry, despite having equipment and expertise that could be highly relevant to local economies. These institutions are often held back by institutional barriers such as lack of outreach mechanisms, underdeveloped technology transfer offices, or limited experience with industry collaboration. A systematic assessment of which labs are actively collaborating — and which are not, but have the potential — is essential to bridge this divide and build stronger, more inclusive university-industry partnerships across Serbia.

5.4.1.3. Current Industry Support Functions

Faculty laboratories currently support Serbian industry in diverse and impactful ways, though often through ad hoc arrangements or isolated initiatives. In the biomedical and health sciences domain, for example, the Faculties of Medicine, Pharmacy, and Dental Medicine (Belgrade, Novi Sad, and Kragujevac) are deeply embedded in both public healthcare systems and private-sector collaboration. They offer services ranging from clinical trials and pharmaceutical testing to the co-development of diagnostics and public health tools. These partnerships not only support innovation but also provide valuable training environments for future healthcare professionals.

In the engineering and IT sectors, laboratories provide services such as mechanical testing, materials analysis, software development, and design prototyping. These capabilities are often delivered through innovation centers and incubators associated with technical faculties — such as those found in Novi Sad's Science and Technology Park or Belgrade's Innovation Centre ETF — which function as intermediaries between academia and industry. These centers are particularly valuable for SMEs seeking to develop new products, validate designs, or implement automation and digital transformation strategies.

Natural sciences faculties, particularly those focused on environmental engineering, chemistry, and ecology, provide expert services like pollution monitoring, waste management consulting, and ISO testing for SMEs in the energy, chemical, and green tech sectors. Meanwhile, faculties of agriculture offer a wide range of laboratory services including food safety testing, soil fertility analysis, and livestock health diagnostics, directly benefitting regional food producers and cooperatives.

Legal and business faculties also play an important role in SME support, albeit more indirectly. Through legal clinics, simulation environments, and consulting centers, they offer services in areas such as commercial law, accounting, strategic planning, and economic feasibility. By analyzing regulatory challenges or offering compliance support, these institutions create enabling conditions for entrepreneurship and innovation — especially in underserved regions.

5.4.1.4. Unlocking Untapped Potential

Despite the broad and impactful engagement described above, many academic laboratories in Serbia remain underutilized, particularly those in regional institutions or less-publicized faculties. Several systemic challenges contribute to this disconnect: limited visibility of laboratory services outside the academic world, the absence of clear procedures for external engagement, and a lack of dedicated intermediaries to connect SMEs with academic capabilities. As a result, SMEs — especially those located outside major urban centers — often struggle to identify and access the facilities that could support their product development or innovation processes.

Digital Innovation Hubs (DIHs) and European Digital Innovation Hubs (EDIHs) are increasingly stepping in to close this gap by offering SMEs access to digital maturity assessments, advisory services, and opportunities for pilot testing in university laboratories. These hubs act as crucial connectors between academic expertise, business needs, and public funding mechanisms, creating structured pathways for collaboration. However, the reach of these hubs remains limited, and many institutions still lack integration into such frameworks.

Identifying underused laboratory assets and enabling their connection to SMEs could significantly boost Serbia's innovation capacity. This includes not only technical upgrades and staff training but also the development of legal, administrative, and digital tools to facilitate public-private collaboration. Visibility platforms like eNauka are a promising start, but they must be complemented by institutional reforms and network-building efforts that make collaboration routine rather than exceptional. Unlocking this potential means converting Serbia's latent academic resources into active engines of economic transformation — from Belgrade to Niš, Novi Sad to Čačak, and beyond.

5.4.1.5. Partner Laboratories and National Mapping Alignment

The following table provides an overview of selected partners and their laboratories of national significance. This representative sample includes university faculties, public research institutes, and innovation centers whose laboratory infrastructure is either well-equipped, actively engaged with industry, or holds high potential for supporting SME-driven innovation. Each entry outlines the partner institution's core specialization, key laboratory capacities, and the scope of its collaboration with the private sector. This mapping serves as a foundation for identifying underutilized resources and enhancing strategic partnerships within Serbia's broader innovation ecosystem.

#	Name	Notable Labs	SME Collaboration	Capacity - Physical	Capacity - Research	Capacity - Collaboration
1	Innovation Centre, Faculty of Electrical Engineering (ICEF), Belgrade	Six specialized labs (e.g. Software Engineering & AI, Automation & Signal Processing, eHealth & Biomedical, IoT, Lifelong Learning) supporting diverse engineering R&D	Acts as a bridge between academia and industry, with 350+ projects involving companies and research institutions; offers access to university labs and includes experts in industry-driven projects	New high-tech labs opened (VR, eHealth, automation) equipped with advanced sensors and computing systems; located within the Electrical Engineering faculty campus	~54 researchers (16 PhDs/postdocs employed, 38 project-based associates) as of 2023; over 150–350 R&D projects completed in cutting-edge fields (AI, IoT, etc.)	Integrated in national and international networks (part of European Digital Innovation Hub); collaborates with global partners (e.g. EU universities, EIB-funded programs) and welcomes new partnerships openly
2	Development Agency of Serbia (RAS)	No dedicated labs (government agency) – focuses on programs and services rather than own labs	Supports SMEs through grants, training, and the Enterprise Europe Network; connects local SMEs with multinational companies and investors; one-stop shop for business support	Headquarters in Belgrade; coordinates a network of 16 accredited regional development agencies across Serbiadevex.com, providing nationwide outreach	Implements numerous projects to boost innovation and competitivenessweste rnbalkans-infohub.eu; does not conduct in-house research but facilitates R&D funding and SME innovation programs	Broad collaboration with government, international donors (EU projects) and regional agencies; organizes forums uniting businesses from Serbia and abroad; acts as a central hub linking domestic and foreign partners in economic development

3	Innovation Centre, Faculty of Mechanical Engineering (ICMF), Belgrade	Equipped with cutting-edge laboratories for prototyping, materials testing, rapid fabrication (e.g. 3D prototyping lab, materials property testing lab), supporting mechanical and industrial engineering innovation	Bridges academia and industry by applying research to new products; offers consulting and technical services to manufacturing SMEs (quality control, certification); hosts cross-disciplinary projects with industry (e.g. Smart Manufacturing Systems)	Modern facilities at Faculty campus with space, labs, and high-end equipment for chemical, biotech, and mechanical processes; ISO 9001 certified operations	Team of ~66 researchers (18 PhDs and 48 PhD students) driving applied R&D; participates in international R&D networks and numerous projects (from water management to advanced manufacturing)	Active collaboration via international partnerships and networks (EU projects, COST actions); routinely involves industry partners in projects and technology transfer, and provides mentorship for PhD students in collaboration with companies
4	University of Belgrade – Faculty of Chemistry (UBFC)	147 research laboratories across six departments (including specialized labs for Proteomics, Molecular Biology, Cell Culture, Structural Analysis) – hosts Serbia's first Proteomics Center and advanced analytical facilities	Engages in contract research and joint projects with industry (especially food, biotech sectors); works with companies on food safety, biotechnology, and chemical analyses (triple helix collaboration); many partnerships with EU institutes for knowledge exchange	~27,000 m² of research and teaching space in central Belgrade, with modernized labs (upgraded with >€1 million equipment for molecular biotech); houses state-of-the-art instrumentation (NMR, mass spectrometry, etc.)	~96 permanent research staff (46 senior researchers + ~50 assistants), plus numerous doctoral students; high research output in chemistry, biosciences, food tech – significantly enhanced by EU-funded capacity-building (infrastructure and hiring)	Deeply integrated into international research networks (collaborations with institutes in Finland, Sweden, France, etc.); participates in EU projects and COST actions, and collaborates with domestic industry on innovation (e.g. work-contract R&D with food companies)

5	Faculty of Diplomacy and Security, Belgrade (Union Nikola Tesla University)	No scientific labs (focus on social sciences) – features seminar rooms and possibly simulation classrooms for diplomacy/security scenarios	Collaborates with government bodies (e.g. co-organized a security conference with Ministry of Foreign Affairs); engages experts from security agencies in teaching and joint events; provides training for corporate security practices	Urban campus in Belgrade with classrooms and conference facilities; dedicated spaces for simulations, conferences, and IT labs for research in security studies	Academic staff conduct policy and security research; publishes conference proceedings and journals on diplomacy and national security; hosts an annual international conference for knowledge exchanged	Partnerships with ministries (Foreign Affairs, Defense) and international scholars (conference boards include regional experts); involved in Erasmus+ projects and academic networks, aiming to connect students with institutions like police academies and think-tanks
6	Faculty of Mechanical Engineering, Niš (University of Niš)	Internal Institute of Mechanical Engineering and a Center for Motors and Motor Vehicles provide research labs for engine testing and mechanical systems; various departmental labs (energetics, mechatronics, etc.) support engineering R&D	Long-standing collaborations with regional industries – serves as an "entrepreneurial faculty" solving local engineering problemsmasfak.ni.ac.rs; offers expertise and joint projects to boost economic development in southeast Serbia; engages in tech transfer and consults for factories in Niš region	Large academic complex in Niš with classrooms, workshops, and specialized labs; the only MechEng faculty in South-East Serbia, it houses modern equipment across fields (CAD/CAM labs, thermal engineering labs, etc.); ~1,414 students and ample lecture and lab space	99 professors and assistants drive research and innovation; active in numerous projects (Horizon Europe, Serbian Science Fund) on smart transport, AI in energy, biomedical engineering, etc.; hosts international conferences (e.g. RAILCON) to disseminate research	Collaborates with international universities (e.g. dual Master's with TU Berlinmasfak.ni.ac.rs) and is integrated in European projects consortiamasfak.ni.ac.rsmasfak.ni.ac.rs; strong local ties – works with City of Niš and companies (many alumni employed regionally), and co-founded STP Niš network to connect with startups

7	Faculty of Technology, Leskovac (University of Niš)	Accredited laboratories with modern R&D equipment for chemical, biotechnological, food and textile technologysr.wikipedia.org – e.g. labs for Food & Biochemical Engineering, Microbiology, Textile Quality Testing, Spectroscopy, Polymer Engineeringsr.wikipedia.orgsr.wikipedia.org	Conducts numerous industry-sponsored analyses and projects – labs carry out testing and quality control services for regional food/textile companiessr.wikipedia.org sr.wikipedia.org; longstanding partnerships with local enterprises leverage faculty expertise to improve products and processes	Campus includes specialized lab facilities (pilot plants, analysis labs) equipped with up-to-date instruments; provides workspace for students and researchers (~390 students) and maintains ~50 faculty staffsr.wikipedia.org; serves as a regional hub for applied chemistry and textile technology	Faculty researchers focus on applied science – advancing food technology, environmental chemistry, material science. They produce a scientific journal Advanced Technologies and organize a biennial symposium “Contemporary Technologies and Economic Development” to share researchsr.wikipedia.org. Continuous upgrading of equipment has expanded research capacity in emerging areas (biotechnology, textile engineering)	Collaborates closely with local industry (projects for improving local food products, textile manufacturing)sr.wikipedia.org; part of national innovation programs (e.g. EU PRO, Innovation Fund projects) aimed at regional development; engages with community via training and publications for technology diffusion

8	Faculty of Technical Sciences, Čačak (University of Kragujevac)	Multiple laboratories covering electronics, electrical engineering, materials and IT – e.g. Advanced Materials Lab, Electronics Lab, Electrical Measurements Lab, Electric Machines & Drives Lab (EMDA)ftn.kg.ac.rsrs.linkedin.com; also hosts industry-sponsored labs (e.g. VTool Lab for chip design verification)	Signs numerous contracts annually with businesses to transfer research into practicex2-0.eu; provides R&D and prototyping services to local companies (automation, software, etc.); co-founded the Science Technology Park Čačak to incubate startups and link companies with faculty expertsx2-0.eu	Modern campus with labs, workshops, and a new Science Tech Park extension – significantly expanded facilities by integrating with Čačak's technology park, uniting teaching, research, and industry under one roofx2-0.eu; offers co-working and incubation space for student startups	Dozens of faculty researchers across diverse fields (IT, electronics, mechanics) drive innovation; engaged in applied research projects (e.g. smart systems, green energy) and publish in journals like Serbian Journal of Electrical Engineering; hosts international conferences and student innovation competitions, bolstering research culture	Strong regional and international collaboration: partners with the Čačak city and Western Morava industry cluster, plus academic collaborations abroad. It is integrated into Serbia's innovation network – the faculty is part of a system of tech parks and innovation centers sharing best practices and jointly mentoring startupsx2-0.eux2-0.eu
9	Faculty of Natural Sciences and Mathematics, Niš (PMF Niš)	Numerous scientific laboratories within departments of Physics, Chemistry, Biology, Geography, and Mathematics. Notable facilities include chemistry labs (for synthesis and analysis),	Collaborates with schools and institutes – e.g. training science teachers, partnering with CERN on physics research outreachindico.cern.ch; provides expert services to local government and industry (environmental	Sprawling faculty building in Niš with lecture halls, research labs, and a science library. Ongoing expansion addresses space shortages (chemistry labs are being relocated to a	~100+ academic staff engaged in fundamental and applied research across natural sciences. Active in national projects (e.g. Serbian Science Fund grants) and	Networks with both academia and industry: part of CERN-associated programs for high-energy physics trainingindico.cern.ch; cooperates with Serbian Academy of Sciences institutes; joins local

		biology labs (for ecology and molecular biology), a dedicated computer center for mathematicians, and a planetarium/observatory for astronomy (supporting physics education)	impact studies, geospatial analysis for planning). Some labs offer testing services (water/soil analysis) to regional SMEs under consulting arrangements	new wingjuznevesti.com). Houses specialized collections (e.g. a botanical garden for biology, mineral collections in geology) enhancing physical resources for research and teaching	international collaborations (Horizon Europe, bilateral projects) in fields like materials science, biodiversity, and computational mathematics. Publishes several scientific journals (e.g. Chemia Naissensis) and conference proceedings, reflecting robust research output	municipal projects (e.g. environmental monitoring for companies). Collaboration capacity is also seen in hosting science festivals and partnering with other faculties to promote STEM innovation in the region

10	Institute for Artificial Intelligence Research and Development of Serbia (Serbian AI Institute)	Organized into thematically-focused research groups rather than traditional labs – e.g. Human–Computer Interaction, AI in Healthcare & Life Sciences, Visual Computing & Perception, Smart Factory teamsivi.ac.rsivi.ac.rs. Each group has dedicated researchers and computing infrastructure for AI model development and testing	Works closely with both global tech companies and local startups – pursuing joint R&D (e.g. partnered with China's Peng Cheng Lab on a Serbian language NLU model) and providing AI solutions to Serbian SMEs. Emphasizes commercialization: patents and spin-offs are encouraged, and IP policies favor researchers and industry partnersai.gov.rs	Offices distributed in major innovation hubs: headquarters in Novi Sad's Science Technology Park, with additional offices in Belgrade, Kragujevac, and Niš Science Parkai.gov.rsivi.ac.rs. This gives state-of-the-art workspace countrywide, including high-performance computing facilities and collaborative coworking areas	Established in 2021, it has rapidly grown a team of eminent AI scientists (including returning Serbian talent and international experts). Participates in multiple EU Horizon projects (e.g. AI for flood resilience, TANGO for next-gen AI)ivi.ac.rsivi.ac.rs. Research output spans automotive AI, medical diagnostics AI, NLP, etc., aiming to make Serbia an "AI superpower"ai.gov.rs	Extensive collaborations: part of the European AI ecosystem (member of CLAIRE, GPAI initiatives); formal MOUs with foreign institutions (e.g. Royal Science & Tech Park of Eswatiniivi.ac.rs). It integrates with local academia (mentors PhDs at universities) and industry (co-develops solutions for finance, medicine, government). Also a key node in Serbia's digital innovation hubs networkai.gov.rs

11	Science Technology Park Niš Ltd. (STP Niš)	Features an Innovation Lab with a cutting-edge 3D Printing Lab (latest additive manufacturing equipment) and a Makerspace for hardware prototypingiasp.wsiasp.ws. These facilities enable startups to develop and test product prototypes on-site	Directly supports startups and tech SMEs – incubating innovative companies and facilitating joint projects between university scientists and businessesiasp.ws. Offers mentorship, training, legal/financial advice, and helps connect SMEs to funding and marketsiasp.wsiasp.ws	~14,000 m² of workspaceiasp.ws in a modern park complex adjacent to University of Niš. Provides private offices, co-working areas, conference rooms, and lab spaces. Its proximity to several engineering faculties gives tenants access to talent and university research infrastructureiasp.wsiasp.ws	Not an academic or research institute itself – but hosts dozens of startups that engage in R&D. Facilitates industrial research by providing space and equipment for tech development. Joint research projects (scientist-company collaborations) are carried out within the park. The park's impact is seen in spin-off companies and commercialization of university research	Serves as a regional innovation hub: close ties with University of Niš (talent pipeline)iasp.ws and part of the IASP international network. Collaborates with other parks (Belgrade, Čačak) and local authorities to strengthen the innovation ecosystem. It also partners on donor projects (e.g. EU PRO) to boost startup capacities, integrating Niš into global tech networks

12	ZIP Centre for Youth – Business Incubator, Pirot (ZIP Pirot)	Provides co-working offices, training rooms, and a small IT lab for entrepreneurs (e.g. for basic software training); not a laboratory-based center, but a facility offering office infrastructure and meeting space to startups	Focused on youth and startup SMEs: since 2012 it has incubated 30+ new companiesledo.pirot.rs. Offers mentoring to aspiring entrepreneurs (over 30 individuals mentored outside the incubator) and organizes on-the-job training with local businesses – 15 companies took interns, resulting in ~45 youth hiredledo.pirot.rs. Also runs IT skill courses (e.g. basic IT for 30 trainees, C# programming for 45)ledo.pirot.rs	Incubator building in Pirot's city center with ~10 resident startups at a time and a adjacent Startup Center hosting ~20 young entrepreneursledo.pirot.rs. Equipped with essential office infrastructure, high-speed internet, and a conference room. The center was renovated and equipped with EU funds (RSEDP2 program) to create a modern entrepreneurial space in a small cityledo.pirot.rs	Not a research institution; its capacity lies in business development support. It has successfully delivered numerous training and entrepreneurship programs (as noted, 80+ participants in business basics training)ledo.pirot.rs. By producing guides ("From Idea to Business" handbooks) and hosting workshops, it builds local know-how rather than conducting scientific research	Strong local collaboration: co-founded by Pirot Municipality and NGO Pirgosledo.pirot.rs, it partners with the National Employment Service and local companies to improve youth employment. It also networks with other regional incubators via capacity-building projectsntp.rs. Participates in national programs (e.g. Innovation Fund's regional startup centers network) to share best practices and ensure integration into Serbia's startup support ecosystem

13	Regional Innovation Start-up Centre Novi Pazar (RISC Novi Pazar)	Modern co-working and innovation space (located in the city center's "Old Arched Buildings" passage)riscnovipazar.rs, outfitted with high-speed internet, conference room and a small makerspace for tech entrepreneurs; serves as a local tech hub rather than a laboratory center	Engages local IT firms and the Sandžak Economic Development Agency (SEDA) in mentoring startupssnews.rs. Offers mentoring support and business exercises for nascent SMEs – within its first months (established mid-2020) it already fostered a startup (Resivoje) developing software for businesses. Organizes hackathons and startup weekends to connect youth with established entrepreneurs	A centrally located facility (few hundred square meters) providing open-plan workstations, meeting rooms, and event space. Equipped with modern office technology and communal areas to encourage collaboration. Its accessibility and openness make it a gathering point for Novi Pazar's young innovators	Early-stage center with growing activity: runs training workshops (often in cooperation with Center NIT NGOcentarnit.com) and educational events. While it does not conduct scientific research, it has begun to incubate startups and facilitate idea validation and prototyping (e.g. supporting app development teams). Its "open to new ideas" policy has exceeded expectations by generating significant project interest in just the first 6 monthsfacebook.com	Backed by the City of Novi Pazar and integrated into the national network of 20+ startup centersnip.rs. It collaborates with other regional centers and Science Parks (through a capacity-building program led by STP Nišntp.rs). Also works with local academic institutions (State University of Novi Pazar) and international donors for program support, aiming to put Novi Pazar on Serbia's innovation map

14	Regional Innovation Start-up Centre Kruševac (RISC Kruševac)	Co-working/incubation center with offices and a training hall; not focused on labs, but provides basic tech infrastructure (computers, projector, etc.) for startups and “smart city” solution demos	Partners with the City of Kruševac and local businesses to support startups – e.g. the first incubated company, Resivoje, was showcased to the business communityekapija.com. Provides mentoring from successful local entrepreneurs and links new startups to traditional industries in the Kruševac area (machinery, agriculture) for pilot projects	A dedicated space (approximately 300 m²) within Kruševac’s business support center, newly equipped in 2020. Offers shared desks, a meeting/conference room, and high-speed connectivity. Its central location and modern amenities create an attractive environment for young tech firms in the Pomoravlje district	Focuses on startup capacity-building rather than academic research. Hosts seminars on entrepreneurship, innovation management, and digital skills for its tenants. Through the Innovation Fund program, it received resources to improve its services (staff training, materials), thus enhancing its capability to guide startups through product development and market research	Acts as part of the integrated regional startup support systemnip.rs. Collaborates with the Business Incubator Kruševac and Regional Development Agency to attract teams. Also included in national projects led by STP Niš to standardize support offerings across centersntp.rsntp.rs. This ensures knowledge sharing with other centers (Paraćin, Pirot, etc.) and connection to larger science parks for advanced mentorship

15	Regional Innovation Start-up Centre Paraćin (RISC Paraćin)	A small innovation hub with co-working desks, a meeting room, and an IT classroom for training – no specialized lab equipment, but a functional space for entrepreneurs to work and learn	Focused on developing local entrepreneurship: works with Regional Development Agency (REDASP) and the municipality to mentor startups. Has organized innovation forums (e.g. InnoForum Pomoravlje 2025) with institutional support to connect SMEs with investorsfacebook.com. Also provides one-on-one business coaching to early-stage companies in the Paraćin region	Centrally situated facility in Paraćin town, outfitted with essential office tech and presentation equipment. Though modest in size, it includes a seminar hall used for training sessions and community events. Established ~2019–2020 with government support, it serves as an accessible physical gateway for local innovators	Primarily an incubation/training center, so it doesn't conduct research. However, it has improved its service capacity by participating in the national capacity-building programntp.rs – staff have been trained to help startups in market research, business model development, and even prototyping assistance. It regularly hosts educational workshops for students and aspiring entrepreneurs, boosting innovative potential in the area	Collaboration is a strong suit: partnered with nine other regional centers and Science Parks through an Innovation Fund projectntp.rs. Locally, it works closely with Paraćin Technical School and the Science Club to promote STEM entrepreneurship. It also engages the Pomoravlje District business community via events, integrating the center into both the national innovation network and the local economy

16	Centre for Development of Innovative Activities Ltd. Vrnjačka Banja (CRIA Vrnjačka Banja)	A creative innovation space rather than a lab – includes co-working offices, a training room and a small multimedia studio. It's designed as a "unique space bringing together innovative minds" to brainstorm and develop ideassantosdigital.rs	Targets youth, students, and start-ups in the spa region – offers business consulting and idea incubation. Organizes hackathons and innovation challenges in partnership with NGOs (e.g. a recent women's economic empowerment workshop with UN support was hosted herem.facebook.com). Provides mentorship to local small businesses (tourism, agriculture) to adopt innovative practices	Located in Vrnjačka Banja's town center, the facility is outfitted with modern furnishings and IT equipment. It provides a relaxed yet professional environment (including a lounge and internet café vibe) to encourage creativity. Small in scale, but equipped with conference capabilities and high-speed internet, making it a local innovation hotspot	While not a research institute, it has run several innovation programs and pilots – enhancing its "soft" capacity. For example, it helped develop digital tourism offerings in the region and worked on student startup ideas. Staff are skilled in project management and have led EU-funded local innovation projects. This project experience effectively serves as its research/innovation capacity	Collaborates closely with the Regional Development Agency Zlatibor and local municipalities. It is part of Serbia's network of regional innovation centerss4ai.rs, allowing it to share resources and training curricula. International cooperation is present through donor-funded projects (Swiss and EU programs), and it frequently partners with nearby universities (e.g. faculty from Kraljevo or Čačak) to mentor innovators, thereby extending its collaborative reach beyond the municipality
17	Regional Innovation Business Centre Zlatibor (RIBC Zlatibor)	A Smart City innovation hub featuring ultra-modern co-working space (300+ m²) and state-of-the-art tech equipmentnip.rs. Includes a multimedia	Aims to attract both local startups and global digital nomads – providing mentoring and support to help entrepreneurs turn ideas into marketable productsnip.rs. Backed by	Located on Zlatibor mountain (a tourist center), it boasts the most modern equipment among regional centersnip.rs. The space includes	Instead of conducting research, it provides a platform for others to innovate. Its capacity is evident in programs it runs – e.g. hackathons for smart	Fully integrated into Serbia's innovation network – one of the 20+ centers forming an "innovation and digital map" covering all major regionsnip.rs. It works with

		hall for large tech events, a library, and even on-site accommodation for visiting innovators ("digital nomads")nip.rsnip.rs. It's geared to demonstrate and develop smart city solutions (IoT devices, digital platforms) in a living lab environment	RRA Zlatibor, it connects SMEs in the Zlatibor region (tourism, energy) with tech innovators. The center offers business support and matchmaking for startups, and being a "smart city" center, it collaborates with the municipality on digital infrastructure projects (e.g. open data apps for tourism)	open-plan offices, a fully equipped conference/lecture hall (doubling as a cinema/theater), and lodging facilitiesnip.rs – a unique feature enabling longer innovation retreats. Launched with ~20 million dinar investment, it embeds high-tech amenities in a scenic setting to draw innovators year-round	tourism, training workshops on IoT. With advanced infrastructure, it can host prototype testing (Wi-Fi 6, smart sensors on site). Already, it has engaged dozens of entrepreneurs and hosted tech community meetups, effectively seeding research-like innovation activity in the local context	Science Parks in major cities and exchanges programs (some startups use Zlatibor as a retreat for development). Also collaborates with international organizations via the Swiss-funded initiatives (notably, it was developed with Swiss cooperation supportnip.rs). Overall, RIBC Zlatibor functions as a collaborative bridge between urban tech ecosystems and a regional tourist economy, amplifying innovation outreach in western Serbia

Mapping of Needs for Laboratory Services

Laboratory services play a crucial role in supporting small and medium-sized enterprises (SMEs) by enabling research and development (R&D), product testing, quality assurance, and compliance with industry standards. To maximize the impact of academic and private laboratory resources, a strategic mapping of SMEs' needs is essential. This analysis includes identifying the specific SMEs that require such services, incorporating data from existing studies, and understanding the barriers SMEs encounter when engaging with faculty or institutional laboratories.

5.4.1.6. Identify Specific SMEs Related to Laboratory Services

The first step in mapping the needs for laboratory services is to identify which SMEs rely on these services for their core activities. These typically include enterprises in sectors such as biotechnology, pharmaceuticals, food and beverage, environmental monitoring, materials science, advanced manufacturing, and electronics. A detailed sectoral analysis helps pinpoint the types of laboratory support required—ranging from chemical analysis and microbiological testing to material stress testing and prototyping.

In addition to industry sectors, geographic distribution and innovation intensity can serve as useful filters. SMEs located within innovation clusters or those engaged in high-value R&D are more likely to seek partnerships with academic laboratories. A targeted outreach and classification system can further help in segmenting SMEs based on their laboratory needs and technological maturity.

5.4.1.7. Use Existing Studies, Reports and Data to Complement the Needs Analysis of SMEs

To build a comprehensive needs map, it is critical to incorporate existing resources, such as regional innovation reports, sectoral surveys, academic studies, and government data. These sources often contain insights into technology usage trends, R&D spending, innovation barriers, and collaboration dynamics between SMEs and research institutions.

For example, data from national innovation agencies or EU-funded programs may highlight gaps in access to laboratory infrastructure or provide case studies of successful SME-laboratory collaborations. Industry associations can also offer white papers and market analysis that further refine understanding of sector-specific laboratory demands. Utilizing this secondary data ensures that the needs assessment is evidence-based and reflects broader economic and policy contexts.

5.4.1.8. Determine the Obstacles that SMEs Face When Using Faculty Laboratories

Despite the potential benefits, many SMEs encounter significant barriers when attempting to collaborate with university or faculty laboratories. Common obstacles include:

- Lack of awareness: SMEs may not know about available laboratory services, capabilities, or equipment within academic institutions.
- Access limitations: Academic labs often prioritize internal research and may have restricted availability for external users due to scheduling or resource constraints.
- Cost and pricing models: Laboratory services may be too costly for SMEs, especially without subsidized access or flexible pricing arrangements.
- Administrative and legal hurdles: Intellectual property concerns, lengthy contracting processes, and lack of clear communication channels can discourage SMEs from engaging.
- Cultural and organizational differences: Misalignment in expectations, timelines, and working styles between academia and industry often leads to ineffective collaboration.

Identifying and addressing these obstacles is essential for developing strategies that foster greater SME engagement. Solutions may include creating dedicated liaison offices, simplifying procedures for external collaboration, offering subsidized lab access, and launching awareness campaigns tailored to SME communities.

5.4.2. Recommendations for better use of laboratories

5.4.2.1. Mechanisms for Better Connecting SMEs and University Laboratories

A foundational element in fostering innovation through research laboratories is establishing accessible and structured mechanisms for connecting SMEs with available academic resources. It is, therefore, essential to introduce a clear and practical mechanism for managing laboratory occupancy and service reservations. This could involve standardizing request procedures, implementing transparent scheduling protocols, and designating contact persons for each lab to handle SME inquiries efficiently. The goal is to create a predictable and coordinated system for SMEs to express interest, check availability, and schedule use of lab services—ensuring smoother communication and better planning for both parties.

Another high-impact mechanism is the organization of regular matchmaking events—such as innovation fairs, open lab days, and technology-themed B2B meetings—that pair SMEs with research teams or lab facilities based on thematic compatibility. Such events help reduce the information gap between academia and industry, making it easier for SMEs to discover technical solutions aligned with their needs. Integrating these matchmaking into the Serbian European Digital Innovation Hub on AI ecosystem enhances regional and cross-border collaboration by ensuring local SMEs benefit from EU-wide networks and services.

Moreover, a dedicated coordination unit within the S4AI HUB should act as a single point of contact for SMEs, guiding them through the engagement process. This unit could also proactively identify SME challenges and match them with appropriate lab expertise or upcoming research initiatives. These mechanisms together build a more transparent, user-friendly environment that demystifies university collaborations for SMEs.

5.4.2.2. Collaboration Models That Facilitate SME Access to Laboratory Services

Effective collaboration models are essential for creating a bridge between SMEs and academic infrastructure, especially in fields like AI and digital innovation. One widely used model involves the development of joint research projects, where university labs and SMEs co-design experimental goals and share both the risks and rewards. These projects often focus on product development, proof-of-concept validation, or the application of AI techniques in industrial settings.

Another approach is offering contract research services, where SMEs outsource specific technical challenges to university labs. This model is particularly beneficial for smaller businesses that lack internal R&D capabilities, allowing them to tap into state-of-the-art expertise without long-term commitments. To further ease access, some innovation hubs offer open innovation services, which include collective prototyping, shared testing environments, and collaborative use of intellectual property developed within the lab ecosystem.

Establishing innovation sandboxes—temporary, low-risk environments for testing AI solutions—is also gaining traction. In this model, SMEs are granted temporary access to specialized lab settings under structured conditions, often with technical mentorship from faculty or PhD students. Finally, embedding lab technicians or postdoctoral researchers within SMEs on a rotating basis allows direct knowledge transfer and builds long-term partnerships. By combining these models into flexible, need-based offerings, the HUB can ensure that laboratory collaboration is adaptable to the diverse innovation capacities of SMEs.

5.4.2.3. Identification of Financial, Organizational, and Technical Barriers

Despite the opportunities, SMEs frequently encounter significant barriers in accessing university laboratory services. Financial constraints remain the most common, with many SMEs unable to afford the fees associated with high-end equipment, technical staff, or software licenses. In sectors where R&D cycles are long and return on investment is uncertain, this creates a substantial deterrent to experimentation and innovation.

Organizationally, SMEs often struggle with limited internal capacity to engage with academia. Many lack dedicated innovation managers or personnel with the time and know-how to identify relevant lab services, submit proposals, or manage collaborative research projects. Additionally, academic institutions may present unfamiliar administrative procedures, intellectual property regulations, or slow decision-making processes that are incompatible with the fast-paced nature of SME operations.

Technical barriers also persist. Advanced lab equipment typically requires specialized skills or certifications, making it difficult for SMEs to operate independently. Moreover, many SMEs do not have the in-house expertise to interpret experimental results or integrate findings into production workflows. A lack of visibility into available services and uncertainty about expected outcomes can further discourage engagement. Collectively, these financial, organizational, and technical hurdles limit the extent to which SMEs can capitalize on the innovation potential housed within academic laboratories.

5.4.2.4. Solutions for Overcoming Barriers to Lab Access

To lower the barriers and democratize access to lab infrastructure, the S4AI Hub introduces a combination of financial, educational, and administrative support mechanisms. A high-impact starting point is the implementation of a subsidized access scheme. Through national or EU funding programs, the HUB can offer vouchers or direct subsidies that partially or fully cover the cost of laboratory services for SMEs, especially during early-stage experimentation or feasibility testing.

Complementing this, the S4AI HUB could provide structured training programs aimed at upskilling SME personnel. These may include certification workshops for equipment use, tutorials on AI tools, or guided sessions on experimental design. By increasing SMEs' technical readiness, the HUB makes lab access more sustainable in the long term.

Administrative simplification is equally critical. A "fast-track" system for SME collaboration—featuring standard contracts, streamlined IP agreements, and clearly defined service packages—can remove many procedural bottlenecks. A liaison team or concierge service within the S4AI Hub can act as an intermediary, helping SMEs navigate internal procedures, identify funding opportunities, and align expectations.

Lastly, establishing a mentorship or co-researcher model, where a designated academic partner supports the SME throughout the project, ensures continuity and increases project success rates. These combined measures empower SMEs to access, utilize, and benefit from laboratory services with significantly fewer constraints.

5.4.2.5. Strategies for Promoting Laboratory Services Among SMEs

Even the most advanced labs remain underutilized if SMEs are unaware of their existence or do not understand their value. Promotion must therefore be embedded into the S4AI hub's operational model. A foundational strategy is to collaborate closely with business associations, chambers of commerce, and local startup networks. These partners serve as trusted intermediaries that can disseminate information, co-host events, and endorse lab services through familiar channels.

In parallel, the S4AI hub should maintain an active presence at industry events, expos, and technical conferences, where it can demonstrate use cases, offer mini-labs or live demos, and distribute success stories. Organizing thematic roadshows or regional tours—especially in less urbanized areas—can extend outreach to underrepresented SME populations.

Digital communication also plays a central role. A well-curated website, regular newsletters, and active social media channels should present lab offerings, testimonials, and upcoming opportunities in a visually compelling and jargon-free format. Video case studies and virtual lab tours can further demystify the experience for SME decision-makers.

Finally, the HUB should celebrate and publicize successful collaborations. Highlighting tangible business outcomes, such as new product launches or process optimizations achieved through lab work, reinforces the relevance and value of university-based innovation. By combining community partnerships with proactive, multichannel promotion, the HUB ensures sustained visibility and SME engagement across the ecosystem.

6. Conclusions

This document synthesizes the results of four comprehensive analyses—digital maturity of traditional industries, needs and gaps in innovation capacity, SME readiness for digitalization, and challenges faced by Digital Innovation Hubs (DIHs). These studies were conducted as part of the preparatory phase of the S4AI_HUB initiative, whose ultimate goal is to support the digital transformation of Serbia's economy through artificial intelligence (AI).

Problem
Despite widespread awareness of the importance of digitalization, traditional industries, SMEs, and public institutions still demonstrate low levels of integrated application of advanced ICT and AI tools. The core problem lies in the lack of strategies, limited competencies, fragmented infrastructure, and weak cooperation between academic and industrial sectors.

Objective of the Deliverable
The aim was to establish a baseline of digital readiness, identify key gaps, and propose priority interventions that would enable S4AI_HUB to deliver measurable impact on the transformation of SMEs and public institutions.

Methodology
A multilayered approach was applied:

1. Quantitative research – online surveys and structured data sources (e.g., eNauka, SME Hub).
2. Qualitative techniques – focus groups, semi-structured interviews, and case studies.
3. Benchmarking – comparison with European DIH models and KPI frameworks.
4. Synthesis of findings – cross-analysis of insights for formulation of recommendations.

Key Findings

- Traditional industries exhibit fragmented digitalization—mostly applied for operational optimization, not strategic transformation.
- SMEs show growing interest in AI tools, but lack data, skilled workforce, and funding hinder adoption.
- Academic labs have advanced infrastructure, but remain underutilized and invisible to industry; collaboration is mostly ad hoc.
- DIHs vary in service structure and have low visibility beyond large urban centers.

Evaluation of Results
The analyses consistently highlight critical weaknesses in the digital ecosystem and define priority areas for intervention—human capital, process standardization, open data, and resource networking. Key performance indicators (KPIs) were proposed to monitor progress (e.g., process automation rate, number of AI-adopting SMEs, number of academic-industry collaboration projects).

Limitations

- Data coverage – some industrial sectors were underrepresented.
- Time sensitivity – rapid technological change may soon affect relevance of some numerical indicators.
- Subjectivity in qualitative insights – expert opinions may reflect sectoral bias.

Key Recommendation

Establishment of a unified "Lab-to-Market" platform combining: (1) national registry of laboratories with an online booking system; (2) subsidized voucher mechanism for SMEs; (3) modular training programs in AI and data management; and (4) shared MLOps tools hosted on national AI infrastructure.

Evaluation of the Deliverable

The planned objectives were fully achieved: key gaps were mapped, KPIs proposed, and support mechanisms outlined. This provides a strong foundation for the pilot implementation phase of the S4AI_HUB.

Implications for Other Tasks/Projects

- Task T3.2 (AI Toolkit Development): highlights the lack of language support, pointing to the priority of developing Serbian NLP models.
- Task T4.1 (Training & Certification): findings on low digital skills define the curriculum structure.
- National innovation programs: the proposed platform may serve as a model for other thematic DIHs (e.g., green tech).

Future Work

1. Pilot the "Lab-to-Market" platform in three regions (Belgrade, Niš, Novi Sad) within the first year.
2. Develop open, anonymized datasets for training AI models in Serbian.
3. Extend the voucher mechanism to public institutions (hospitals, municipalities) to promote AI-as-a-Service.
4. Implement dynamic KPI tracking with quarterly dashboards.
5. Examine regulatory impacts (AI Act, GDPR) on applied models in Serbia and align operational guidelines.

Through the implementation of these steps, Serbia can turn its identified potential into sustainable, scalable digital growth driven by artificial intelligence.

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