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THE ERA OF RAPID DIGITAL DEVELOPMENTS

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ABSTRACT

The focus of the international scientific conference "ARE WE READY? Society Challenges in Front of Digital Transformation" is the scientific exploration of a new phase of human history, the period in which we live and that has made each of us increasingly aware of the dramatic changes within only a 30-year period.
The presentation of this paper aims to offer a panorama of the main directions of technological advancements, especially in the last three decades, from the industrial revolution to the era of the 4.0 revolution, where the developments of artificial intelligence and CHAT-GPT have taken all-round dimensions by encompassing and finding usage in all aspects of economic and social life. The combination of artificial intelligence and big data has the potential to bring radical changes not only to the economy but also to society and politics.
The paper addresses important questions regarding artificial intelligence, such as: What is artificial intelligence? What are its advantages and disadvantages? Are we prepared for the kind of future that this development is bringing? Is it harmful, and what are the risks of IA and Chat-GPT? Is technology replacing man?
In conclusion, the positive impact of artificial intelligence exceeds the supposed risks from it, but everyone seeks assurance that AGI (Artificial General Intelligence) serves the best interests of humanity and that it does not constitute a threat to human existence, on the contrary, our existence is primary.
***Keywords**: 4.0 Revolution, Artificial Intelligence (IA), CHAT GPT, Big data*

In the last two to three decades, the world experienced rapid technological developments, and especially after the pandemic, the 4.0 revolution is becoming dominant and all-inclusive. Already in the vocabulary of daily communication, in economic and social life, the use of the vocabulary of technology, informatics, computer, iPad, Internet, Fintech, Artificial Intelligence (robotic), Chat GPT, etc. has become normality. Thus, their use is common not only in the economy but also in social life, and education at almost all levels, especially in Universities where they are becoming dominant. That's why today we talk about Universities 4.0.

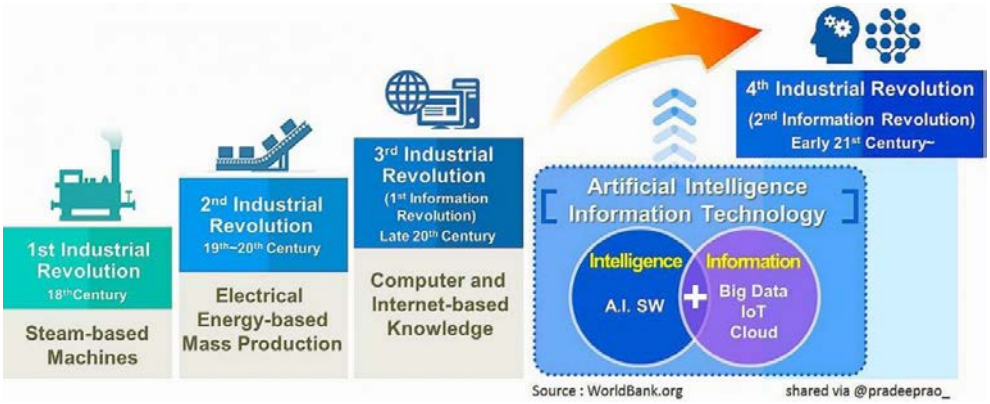
From the industrial revolution to revolution 4.0

Modernity as a historical period is defined by significant technological changes stemming from the industrial revolution. Thus, it is safe to say that developments in the field of technology always precede developments in all social spaces. The social structures cannot exist in the absence of technological developments. History of humanity offers endless examples of entire civilizations that have risen and flourished thanks to technological developments while others collapsed because of the lack of access to these developments.

Thanks to the universal development of digital technology and access to the Internet, we are all living in a new era where businesses, social interactions, and even our private lives are changing in ways previously unimaginable.

Some have begun to refer to this process as the "fourth industrial revolution." It builds upon the three previous stages of the industrial revolution.

It was steam in the 18th century, electricity in the 19th century, and computers in the late 20th century that revolutionized the way we make things and get from one place to another. In the 21st century, it is the interconnection via the Internet of a vast array of computing devices, embedded in everyday objects such as vehicles and household appliances (the Internet of Things) that enables us to live and work in ways that were unthinkable in previous industrial eras.



This "fourth industrial revolution" is possible thanks to cloud computing, which consists of a network of remote servers connected to the Internet to achieve the massive memory and computing power needed to store, process and analyze large amounts of data. It is precisely these technological developments that (as has happened throughout the history of mankind) not

only serve as foundations for economic progress but at the same time, significantly influence all areas of social relations and dynamics.

A look back in time

If we go back in the history of social development to the era of ancient Greece or the Roman Empire, when statues began to be produced and placed in public, humanity experienced great panic and people began to fear that the statue was replacing them.

Parallel to the extraordinary achievements that rapid technological development has brought and is currently bringing, is there today a "panic" or at least, concern and skepticism that technology and artificial intelligence are replacing humans? There is certainly concern about the impacts that artificial intelligence will have in the near future. Notable thinkers such as Jacques Attali and Noam Chomsky have recently expressed reservations about artificial intelligence and its effects on social interactions and society as a whole, as well as about ways our societies should prepare for these impacts.

The invention of the first robots in 1961, which could only perform one command action, was initially met with curiosity and success. However, as technology has advanced exponentially over the last few decades - especially in the last 30 years - skepticism and concern have risen in parallel. And of course, "history repeats itself" in this regard as well. And here I am reminded again of the saying of the ancient Greek philosopher: Most of the things that will happen in the future are the same as those that happened in the past. Of course, in other conditions and circumstances, in times and developments of a different and much more advanced level. And again, despite the unimaginable development, a certain panic has arisen that today, everything is in the process of continuous change, just as Heraclitus thought 25 centuries ago: "Τα πάντα ρέει," meaning that everything flows, everything changes, and the only thing that remains unchanged is change itself.

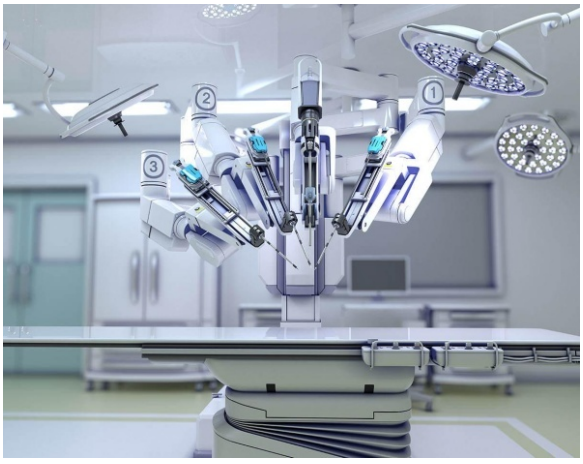
The journey from statues to robots and artificial intelligence

Can we call the historical journey of humanity as the journey from the statue to the robot with artificial intelligence?

By combining artificial intelligence and advances in microtechnology, the next generation of robots will be able to do almost anything a human can, in many cases even more efficiently. Robots that work alongside humans, sometimes called collaborative robots (cobots), can also increase productivity and efficiency. In many cases, machines learn new tasks from humans by imitating

them. As factories become increasingly automated, the workers overseeing the robots are required to have an ever-higher level of specialization. It is estimated that approximately 80% of the job losses in the last thirty years in the manufacturing sector in America occurred due to automation or technological substitution. Many workers had to accept lower-wage jobs in restaurants, fast food, or wholesale stores. Where will the low-skilled service industry workers go when they are replaced by automated cashiers and delivery robots? Over the next thirty years, it is estimated that up to 50% of all jobs may be replaced by technology. When AI robots have access to 3-D and unlimited computing power, it is thought that they will be able to design and build other robots - ad infinitum. And then what? What will happen when previously "safe" professions of white-collar workers, such as economics, law, and medicine, are rendered obsolete by artificial intelligence?

Ultimately, the combination of artificial intelligence and big data may end up changing radically not only the economy but also society and politics. It is undeniable that the development of robots and artificial intelligence has improved our world. With robots shopping for us, building our homes, and sewing and producing clothes for us, our lives have significantly improved. In theory, with more jobs done by robots, we should have more time to devote to our families and friends, take walks in the country and compose music. But with the ubiquity of technology, such as emails and work-related messages we receive on our devices twenty-four hours a day, a stressless life seems even less attainable in the digital age. And with the means of production increasingly concentrated in the hands of only a few corporations or individuals with the ability to accumulate little by little as much profit as possible, the rest of us may be relegated to the status of second-class citizens. Technology certainly makes our lives easier, but does it make them better? Once robots assume human form and begin to think like us, our role as humans becomes unclear. How can we program robots to act ethically? Even worse, what happens when robots and artificial intelligence can be stimulated to harm us?



What is artificial intelligence?

At this point let me try to offer a definition for Artificial Intelligence. We can say that AI gives a computer program the ability to think and learn on its own. It is a simulation of human intelligence in machines to do things that we would normally rely on humans to do.
There are three main types of AI based on its capabilities - weak AI, strong AI, and super AI.
• **Weak AI** - Focuses on one task and cannot perform beyond its limitations (common in our daily lives)
• **Strong AI** - Can understand and learn any intellectual task that a human being can (researchers are trying to achieve strong AI)
• **Super AI** - Exceeds human intelligence and can perform any task better than a human (still a concept)

ADVANTAGES OF AI
Among the main advantages of artificial intelligence can be mentioned:

1. Reduction of human error - One of the biggest advantages of Artificial Intelligence is that it can significantly reduce errors and increase accuracy and precision. The decisions made by AI at each step are decided by previously collected information and a certain set of algorithms. When properly programmed, these errors can be reduced to zero.

2. Zero risks - Another big advantage of AI is that humans can overcome many risks by letting AI robots do them for us. Whether it's defusing a bomb, going into space, or exploring the deepest parts of the oceans, metal-bodied cars are rugged by nature and can survive unfriendly atmospheres. Moreover, they can provide precise work with greater responsibility and do not wear out easily.

3. Disponibility 24x7 - Many studies show that people are only productive about 3 to 4 hours a day. People also need holidays and vacations to balance their work and personal life. But AI can run indefinitely without interruption. They think much faster than humans and perform multiple, simultaneous tasks with accurate results. They can even easily handle tedious repetitive tasks with the help of AI algorithms.

4. Digital assistance - Some of the most technologically advanced companies engage with users using digital assistants, eliminating the need for human

staff. Many websites use digital assistants to deliver content requested by users. We can discuss our research with them in chat. Some chatbots are built in a way that makes it difficult to tell whether we are talking to a human or a chatbot. We all know that businesses have a customer service team that must address customer doubts and concerns. Businesses can create a chatbot or voice bot that answer all their customers' questions using AI.

5. New inventions - In virtually every field, AI is the driving force behind numerous innovations that will help humans solve the most challenging issues. For example, recent advances in AI-based technologies have allowed doctors to detect breast cancer in a woman at an early stage.

6. Unbiased decisions - Human beings are driven by emotions, whether we like it or not. On the other hand, AI is emotionless and very practical and rational in its approach. A major advantage of Artificial Intelligence is that it does not have any biased view, which ensures more accurate decision-making.

7. Perform repetitive tasks - We perform many repetitive tasks as part of our daily work, such as checking documents for defects and sending thank-you notes, among others. We can use artificial intelligence to efficiently automate these mundane jobs and even eliminate "boring" tasks for humans, allowing them to focus on being more creative. Example: In banks, it is common to see multiple document checks to get a loan, which is a time-consuming task for the bank owner. The latter can speed up the document verification process for the benefit of customers and the owner by using Cognitive AI Automation.

8. Daily applications - Today, our daily lives completely rely on mobile devices and the Internet. We use a variety of apps, including Google Maps, Alexa, Siri, Cortana on Windows, OK Google, taking selfies, making phone calls, answering emails, etc. Using various AI-based techniques, we can also predict today's weather and the days ahead.
Example: About 20 years ago, you must have asked someone who had already been there for directions when you were planning a trip. All you have to do now is ask Google where Bangalore is. The best route between you and Bangalore will be displayed on a Google map, along with the location of Bangalore.

9. IA in dangerous situations - One of the primary advantages of artificial intelligence lies in its capacity to create robots capable of undertaking perilous tasks on our behalf. This ability to delegate hazardous responsibilities to AI-powered robots offers a solution to the numerous safety limitations that humans confront. This technology can be effectively harnessed across a spectrum of scenarios, whether they are natural or human-induced disasters, ventures to Mars, bomb defusal, deep-sea exploration, or resource extraction like coal and oil. For instance, consider the catastrophic explosion at the Chernobyl nuclear power plant in Ukraine. During that event, approaching the core directly would have led to fatality within moments. Unfortunately, AI-driven robots were not available at the time to help mitigate radiation's impacts by intervening early to manage the fire.

10. Faster decision-making - Faster decision-making is another benefit of AI. By automating certain tasks and providing real-time insights, AI can help organizations make faster, more informed decisions. It can be especially valuable in high-stakes environments where decisions must be made quickly and accurately to prevent costly mistakes or save lives.

11. Pattern recognition - Pattern recognition is another area where AI excels. With its ability to analyze large amounts of data and identify patterns and trends, AI can help businesses and organizations better understand customer behavior, market trends, and other important factors. This information can be used to make better decisions and improve business results.

12. Medical applications - AI has also made significant contributions to the field of medicine, with applications ranging from diagnosis and treatment to drug discovery and clinical trials. AI-powered tools can help doctors and researchers analyze patient data, identify potential health risks, and develop personalized treatment plans. This can lead to better health outcomes for patients and help accelerate the development of new medical treatments and technologies.

Let's now see the main disadvantages of artificial intelligence.

Disadvantages of artificial intelligence

The main disadvantages of artificial intelligence can be summed up as follows:

1. High costs - The ability to create a machine that can simulate human intelligence is no small feat. It takes a lot of time and resources and can cost a lot of money. AI also needs to operate on the latest hardware and software to stay up-to-date and meet the latest requirements, thus making it quite costly.
2. Lack of creativity - A major disadvantage of AI is that it cannot learn to think outside the box. Artificial intelligence is capable of learning over time with pre-prepared data and past experiences, but it cannot be creative in its approach. A classic example is the Quill bot that can write Forbes earnings reports. These reports contain only data and facts already provided for publication. While it's impressive that a bot can write an article on its own, it lacks the human touch present in other Forbes articles.
3. Unemployment - An application of artificial intelligence is a robot that is replaces human occupations and increases unemployment (in a few cases). Therefore, some claim that there is always a chance of higher unemployment as a result of chatbots and robots replacing humans.
For example, robots are often used to replace human resources in manufacturing businesses in some more technologically advanced countries such as Japan. However, this is not always the case, as it creates additional opportunities for people to work while also replacing people to increase efficiency.
4. They make people lazy - AI applications automate most of the tedious and repetitive tasks. Since we don't have to memorize things or solve puzzles to get work done, we tend to use our brains less and less. This dependence on AI could cause problems for future generations.
5. No ethics - Ethics and morality are important human traits that can be difficult to incorporate into an AI. The rapid advancement of AI has raised a number of concerns that one day AI will grow uncontrollably and eventually wipe out humanity. This moment is called AI singularity.
6. No emotions - From early childhood, we are taught that neither computers nor other machines have feelings. People work as a team and team management is essential to achieving goals. However, it cannot be denied that robots are superior to humans when they work effectively, but it is also true that human connections, which form the basis of teams, cannot be replaced by computers.

7. There is no improvement - Humans cannot develop artificial intelligence because it is a technology based on pre-loaded facts and experience. AI is proficient at executing repetitive tasks, but any modifications or enhancements necessitate manual adjustments to the underlying code. Unlike human intelligence, AI cannot be engaged and utilized in the same intuitive manner; however, it has the capacity to store vast amounts of information.
Machines can only perform the tasks which they are developed or programmed for; if they are asked to perform anything else, they often fail or produce useless results, which can have significant negative effects. Thus, we are unable to do anything conventional.

Is artificial intelligence harmful (dangerous)?

The possibility for artificial intelligence to be harmful can take many forms, but it can basically be divided into three main categories**: cyber-attacks, drone attacks, surveillance, and propaganda**.
Cyber-attacks are widespread in today's world and usually target virtual networks, such as databases and corporate websites. **Drone attacks** allow humans to use advanced technology to attack physical targets and can be used to damage, disrupt, or even destroy almost any modern economy. **The use of artificial intelligence to gain political advantage** through online surveillance or propaganda is already being used by both authoritarian leaders and various politicians and is likely to become more widespread in the coming years.
Artificial intelligence poses an existential risk for people to get 'harmed or killed,' says former Google CEO Eric Schmidt.

- *Artificial intelligence can pose existential threats, and governments need to know how to make sure the technology isn't "misused by bad people," warned former Google CEO Eric Schmidt.*
- *"And existential threat is defined as many, many, many, many people injured or killed," Schmidt said.*
- *The future of AI has moved into the center of conversations among technologists and policymakers concerned with what the technology looks like in the future and how it should be regulated.*

Artificial intelligence can pose existential risks and governments need to know how to make sure the technology "is not misused by bad people," former Google CEO Eric Schmidt has warned. The future of AI has thrust itself into the center of conversations among technologists and policymakers concerned with what the technology looks like in the future and how it should be regulated. ChatGPT, the chatbot that went viral last year, has arguably

sparked more interest in AI, as major firms around the world strive to launch rival products and talk about their AI capabilities. Speaking at the Council Summit on CEO of The Wall Street Journal in London, Schmidt said his concern is that AI poses an "existential threat". "And existential threat is defined as many, many, many, many people injured or killed," Schmidt said. “There are scenarios, not today, but soon enough, where these systems will be able to find zero-day exploits in cyber issues or discover new types of biology. This can be just a fiction today, but the reasoning behind it is likely true. And when that happens, we want to be ready to know how to make sure these things aren't misused by bad people.

Zero-day exploits are security vulnerabilities identified by hackers in software and systems. **Schmidt,** who was Google's CEO from 2001 to 2011, did not have a clear view of how AI should be regulated, but said it was a "broader question for society." However, he said the creation of a new regulatory agency in the US dedicated to regulating AI is unlikely. Schmidt is not the first major tech figure to warn of the dangers of AI. **Sam Altman,** the CEO of OpenAI that developed ChatGPT, admitted in March that he was "a little scared" of artificial intelligence. He said he worried about authoritarian governments developing such a technology. **Elon Musk,** the CEO of Tesla, has previously expressed his concerns about AI, considering it as one of the "greatest risks" to humanity. Even Sundar Pichai, the CEO of Google and Alphabet, who recently introduced the Bard AI chatbot, has acknowledged that AI will have a far-reaching impact on every product and company. Pichai emphasized the need for society to brace itself for these changes. **Eric Schmidt,** who was a member of the US National Security Commission on AI, played a role in reviewing AI technology and its potential regulatory framework. The commission initiated this review in 2019 and subsequently released its findings in 2021, cautioning that the United States was ill-prepared for the AI era.

Now armed with an understanding of both the benefits and drawbacks of artificial intelligence, as well as its potential dangers, one certainty emerges: AI holds immense potential for shaping a better world. The pivotal role for humanity now lies in ensuring that the ascent of AI remains under control. While the debate over AI's pros and cons continues, its influence on the global industry is indisputable, and its growth persists daily, propelling business sustainability. This reality underscores the urgent need for education and the acquisition of AI skills, particularly as they pertain to emerging professions.

Simplilearn's Caltech Graduate Program in AI & ML stands poised to accelerate your AI career, equipping you to engage with one of the most thrilling roles on the planet. The program encompasses foundational AI principles and advanced subjects like deep learning networks, natural language processing (NLP), and

reinforcement learning. Embark on this course today to pave the way for your aspirations in AI and bring your dream career to fruition.

In conclusion, some sort of control is required and will be necessary if we are to limit the chances for all this new technology to harm us. The question is not only how we will be able to control the immense power unleashed by robots and artificial intelligence but also who will decide who will have the power to regulate the technology that is taking over almost every aspect of our daily lives?

Is technology replacing humans?

Technology is gradually supplanting human roles. The once-human culinary duties at home are now automated, numerous industries and sectors see their workforce replaced by machines, and automobiles autonomously navigate sans drivers, steered by technological prowess. At present, tasks and even medical procedures can be executed remotely across vast distances in real-time. Robots emulate human speech and actions, mirroring our capabilities. Even the frontiers of space exploration are being advanced by highly sophisticated technological instruments.

We could claim authorship or even 'discover a previously missing work' actually produced by software powerful enough to imitate it. Currently, these artificial bits of intelligence are not yet creative or substantially productive. Nevertheless, their evolving advancement is intriguing, driven by their ceaseless learning from diverse activities. In the near future, forthcoming iterations of such software might efficiently replace humans in a myriad of tasks. Professions demanding elevated skills, including lawyers, translators, accountants, financial analysts, and journalists, are particularly at risk. Recent studies suggest that a substantial quarter of jobs across the United States and Europe could be rapidly supplanted by AI-generated systems. This trend extends to consultants, engineers, architects, video game designers, and software developers. Remarkably, technical progress is poised to proletarianize even highly skilled tasks.

All this is nothing compared to what will await us a little later: Each of us will one day be able to create whatever he likes - thanks to a later version (probably number 25) - children's stories, novels, philosophical essays, musical works, sculptures, photographs, films, and software. Furthermore, we can entrust this software with the task of inventing other software capable of creating increasingly more creative software. Everyone can delegate these creative activities to artificial intelligence that will be their intellectual and artistic assistant. It is perfected more and more; and again, money will allow some to have increasingly sophisticated assistants of this kind. This software will then

be able to take initiative. To begin with, they can write emails in your style, using your mailbox or that of a private or public manager, to issue orders, reveal secrets, or order embargoes. By multiplying they can create indescribable disorders. And even worse, artificial intelligence will be able to band together to use such applications against humans, or humanity in general.

All these risks are real. And much closer than you think. It is not about avoiding them, or about neglecting them. Neither are we satisfied with marveling at the innocent games that this software now allows, nor with the awesome tools they will put in our hands to reflect, create, progress, and enjoy better. A robot a while ago was giving the news in visual media, meanwhile cyber attacks that threaten all forms of security are being encountered more and more, in the same way as in armed conflicts like the one that is happening between Russia and Ukraine, where drone attacks are taking lives every day. **What is happening? Are we prepared for the future that this development is bringing?**

Are we prepared for the future that this development is bringing?

Thus, the trend towards automation and data exchange in production technologies and processes, which include cyber systems, the industrial internet of things, cognitive computing, and artificial intelligence, has and will have impacts in the near future which will be the main components of this era and no space of interactions in our economic and social life can remain detached from this revolution. Such social spaces as universities are already beginning to be conceived as University 4.0, while interactions such as financial ones (payment forms, digital lending, cryptocurrency platforms, etc.) are increasingly being built as FinTech; on the other hand, telemedicine also seems to rule. But also social practices and activities such as politics or diplomacy are starting to be built around the digital space. Albania has made progress in the development of technology and digitization processes by introducing online services in several different sectors and services. Now it accelerates this process by implementing "The 2022-2026 Digital Agenda", where Artificial Intelligence will be a priority in these developments. To these developments, we can add the last one that has taken the name of...

ChatGPT

ChatGPT is an Artificial Intelligence model initially unveiled in 2018 and subsequently enhanced in July 2020. It possesses the capability to engage with users through chatbot-style interactions, comprehending and responding in the natural language employed by the users. ChatGPT, which stands for Chat Generative Pre-Trained Transformer, functions as a prototype communication agent powered by artificial intelligence. It was crafted by OpenAI with a specific focus on facilitating dialogues.

ChatGPT's virtual assistant is based on OpenAI's GPT language model and is continuously refined through the use of supervised learning and reinforcement learning techniques to improve the software's performance. ChatGPT can generate answers to questions, complete sentences, translate texts, write articles, and even have conversations with people. It can also synthesize texts based on a given set of constraints, such as tone, style, and theme. It has been used in various applications, such as generating captions for videos and creating chatbots.

Due to its many capabilities, the prototype also raises concerns due to possible misuse for malicious purposes, risks of plagiarism in the academic world, and possible job cuts in certain sectors. ChatGPT also raises security and privacy concerns, as the model can be used to generate fake text and misleading information. Launched in November 2022 in a free, offline version, ChatGPT has enjoyed extensive media exposure and received a generally positive reception, although its factual accuracy has been criticized. As of January 2023, ChatGPT has over 100 million registered accounts.

It is designed to simulate human-like conversations on various topics. In the last year, there has been an increased use of GPT Chat by students of different fields of study, but we must admit that the first and most in number are the students of informatics profiles, Information Technology, etc. This is because these students are closer to technology and know well how it works. These years, after the pandemic, can be called the years of the technological revolution, precisely because now people, professionals but also students must get used to the changes that have occurred and are occurring in Artificial Intelligence and the impact it has in every field of life. ChatGPT is able to generate answers to questions, complete sentences, translate texts, write

articles, and even have conversations with people. It can also synthesize texts based on a given set of indications, such as tone, style, and theme. It has been used in various applications, such as generating captions for videos and creating chatbots. **According to Jacque Attali:** "'... students use Chat-GPT mostly as a search engine to find the answer to many questions they may have. But they can also be used to solve many exercises or educational problems. In addition to the literature provided in the educational programs, this platform helps students find answers to questions that may arise during the educational process. Many students have already realized this and use ChatGPT to prepare presentations, and dissertations, develop thesis plans, or write texts in the style of Stendhal or James Joyce. However, their progress is fascinating, as they are constantly learning with everything they do and how they are used."
A truly global set of regulations or Charter should be put in place as soon as possible, recognizing the expectations for artificial intelligence, but prohibiting them from harming their human authors. As the great American science fiction writer Isaac Asimov noted in 1942: "Of course, we won't. Just as we haven't effectively done it on taxes, nuclear weapons, or genetic engineering." At least we must be aware and recognize, on this subject as on many others, the urgent need for a planetary rule of law and rights.

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Towards UNIVERSITIES 4.0. - Development opportunities, new scientific values and employment.

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Abstract

In all of human history, it has never happened that humanity faces such significant challenges, which with a cosmic speed are changing the "old world" towards a new world full of splendour and dangers at the same time. Revolution 4.0 and artificial intelligence are being considered as the "stone age of the electronic brain". Developments in artificial intelligence coupled with robotics and genetics are profoundly transforming humans and society.

New communication technologies are endlessly expanding the path to knowledge, they are fundamentally modifying the process of communication of knowledge and professions, they are democratizing knowledge, scientific research and professional training. We are experiencing a social and cultural revolution that is "questioning and discussing" the institutional and traditional models of schools and universities. The society of the future is building the universities of the future.

In order to anticipate these challenging modern trends of the 21st century, in many countries, where the most developed ones naturally dominate, the establishment and consolidation of the "Universities of the Future" has begun, whose aim, especially for the students, is " they give the public, especially the new generations, a panoramic vision of the digital future world, become halls and laboratories of findings and debates of these developments, help in a clearer and more realistic perception of the future, create the skills of necessary creative and adoptive, pedagogical and professional, to highlight the opportunities of future development, the creation of new scientific values and employment.

University 4.0. is a business, an employer, a key player in its sector and territory, and a partner of communities and public authorities. It is the place of creativity and the spread of knowledge, an essential pillar of equal opportunity. The university is able to provide highly qualified flexible and innovative human resources. It promotes academic research, and the creation of scientific, technological, and cultural wealth and contributes to economic and social development.

The entrepreneurial university is financially autonomous. It is active in the sustainability of financial resources to realize its objectives and ambitions

which are guided by innovations, advanced technologies, artificial intelligence, big data, start-ups, etc.

In a world of digital, robotic, artificial intelligence, nanotechnologies, biotechnology, cognitive sciences, information technologies changes and dizzying developments, the challenge is forming "our capacities, skills, and knowledge" in response to these developments "with cosmic speed".

***Keywords**: Revolution 4.0; artificial intelligence; Universities of the Future; University 4.0; skills, and knowledge;*

In many countries of the world, there is great political, academic, and social concern and commitment in search of answers that fundamental challenges require, such as:

- What is the role and place of universities in the society of the 21st century?
- What should the mission of universities be in terms of the spread of knowledge, the quality of graduate students, scientific research, innovation, the 4.0 revolution, and the economic and social development of each country?
- How are globalization and technological revolution affecting the "formatting" of the universities of the future?

At the beginning of this century, debates about the future of universities and scientific research are focused on their direct and indirect impact on the four major forces of change in the modern world: stimulating new technologies, coping with and benefiting from the effects of globalization, forming of quality social capital, and the improvement of good governance. “Education needs to be aligned with the fundamental changes in the nature of work and address the issue of employability,” excogitated Albert Einstein.

The concept of what a University ought to be has changed over the last 50 decades. Well-off countries are moving towards the “Knowledge Economy” model of development and the Universities are bound to play a more constructive role and take up a leadership position in globalization and technological advancements. “Knowledge Economy” a term coined by Peter Drucker (1969) in his book, The Age of Discontinuity, discerns four major areas of discontinuity:

– the impact of new technology on the industrial structure;

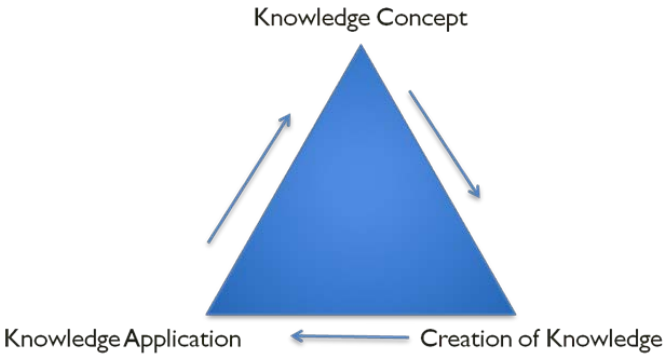
-the shift from an "international economy" to a "world economy" which as yet lacks policy, theory, or institutions;

- a new sociopolitical reality, embracing business, government, and other pluralistic institutions, which poses drastic political, philosophical, and spiritual challenges;

- the rising importance of knowledge and formal education, with resulting implications for work, life, leisure, and leadership.

Knowledge economy includes:

Keeping the idea of the “Knowledge Economy” in mind, Universities of the Future need to align themselves with the changing faces of Industry 4.0, and hence Education 4.0. The Universities have to adopt Education 4.0 where the learner is at the centre of the education economy. University 4.0 has to remain relevant and in sync with the changing industry requirements.



The quality of universities and scientific research vis-a-vis the economic and social development of a country, are considered equal to the effects and productivity provided by modern technologies, innovations, and advanced forms of management.

The role of universities and scientific research and their recommendations are evaluated as key to the economic competitiveness of each country. One of the primary indicators of economic and social success of developed and developing countries is the performance of their university system and scientific research, the role and quality of the human capital they produce, guided by the philosophy that *"universities must produce quality minds and not just heads filled with information, knowledge, and know-how,"* prioritizing individual and collective creativity in the service of development.

For all countries, technological progress has been the engine of their industrialization and development. Since the industrial revolutions of the XVIII-XIX centuries and until today's "Revolution 4.0" it has been proven that the development of a country stems from scientific knowledge put to practice rather than the mere abundance of natural resources. *The synthesis of this experience in promoting economic development is and remains the essential role of education and professional training.*

• Can a comprehensive definition be given for the mission(s) of universities today?

• Can the "ideal university" be portrayed?

• Can it be determined which is the best way of organization or their best model?

From a broad historical and geographical perspective, we find universities organized in four different ways:

• "**Universities of liberal arts**" mainly offer first-cycle studies in the field of liberal arts and sciences. Their main aim is to provide general cultural, social, and academic knowledge in the natural sciences and humanities, knowledge of culture and human heritage, as well as stimulate the development of logical and intellectual capacities in students, more than their professional or technical training.

• "**Scientific universities,**" guided by science and the positivist methodology, hold their principal mission as the "pursuit of truth and fundamental scientific research," as well as the pursuit of "applied research." Through fundamental university research, the aim is to elucidate the foundational laws and principles within various sciences. Meanwhile, through applied research, they focus on implementing specific actions and projects within these scientific domains.

• "**Public service universities**" are related to the economic and political developments of the country, training experts and managers for the needs of the State, administration, central and local government, that is; universities at the service of society, the State, and the needs of economic and social development. In general, this type of university functions as a public entity financed by the State.

• "**Business universities**" are oriented toward the needs of entrepreneurship, economic and financial development, and quality experts. They are university bodies created by business associations, corporations, chambers of industry and commerce, national and international networks of development, transfer, and marketing of innovations, research and development institutes, etc. They are mainly private universities, currently in continuous expansion.

More generally, these four forms of university organization can be summarized in two main categories:

• "**Academic models**" that include liberal and scientific universities, and

• "**Utilitarian models**" that include public service universities and business universities, which tend to be the most frequented.

The "Utilitarian models", which are closest to the academic world, are currently "competing within the framework of globalization". Among them, a "war" for dominance is taking place between: "**The Anglo-Saxon model"; "the traditional continental European model"; and the "East Asian model.**"

Beyond this "war" of university models and educational philosophies, the crystallization of a new concept of universities has begun to emerge, summarized by the term "**universities of the future 2050**", which are seen as the main instrument of clear understanding and reflections, centred around the 4.0 revolution, big data, digital revolution, artificial intelligence, start-ups, etc, which have extraordinary effects and consequences on the economy, employment, health, environment, agriculture, food, security, and the whole society today and in the future.

So, in light of all of this, what does University 4.0 look like? It is suggested that four features will come to define University 4.0.

- First, universities will provide on-demand learning in multiple modes, with a seamless handoff between those modes.
- Second, there will be a move away from degrees as the only form of credential offered, towards a more mixed offering of degrees plus shorter cycle qualifications and credentials.
- Third, there will be a much stronger focus on career management for students, both while they are at university and when they become alumni, and this will go beyond 'career advice' in its traditional forms of the past, and will include things such as the ability to 'top up' standard university qualifications throughout a working life.
- Finally, universities will become physical sites for co-location and research collaboration with industry, and as brokers of relationships between young entrepreneurs and potential mentors, supporters and funders.

In conclusion, while we have described a trajectory that I believe universities must now follow, it remains to be seen whether they will be able to follow it, particularly given industrial frameworks that make change extremely arduous in the higher education sector.

For that reason, decisions universities make about business models for taking advantage of these new trends will be crucial, and no doubt some will succeed and some will fail.

Finally, University 4.0 represent an era in which the traditional status hierarchies of universities will be challenged. The universities that are best able to adjust to change will be able to transform perceptions of their prestige and desirability, perhaps very quickly, and we may see the emergence of new

models for what it means to be a great university in the modern era. To adapt a phrase, it is an exciting time to be in higher education.

The Evolution of Universities and Education: From Universities 1.0. to Universities 4.0

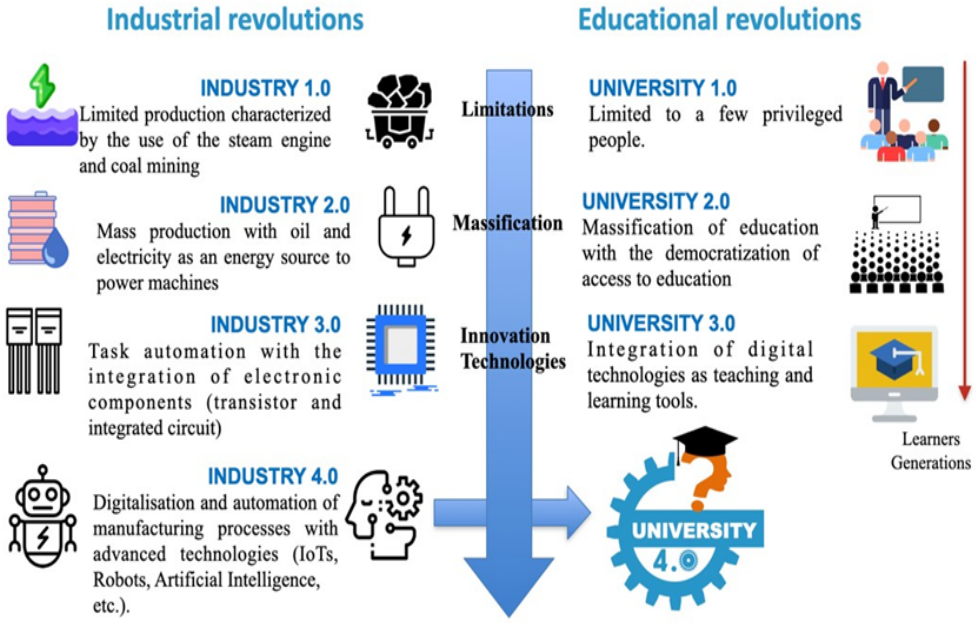
In addition to considering the requirements of Education 4.0, University 4.0 provides autonomous management of learning processes based on the integration of the physical and digital worlds in order to improve and adapt learning. We take inspiration from the different industrial and educational revolutions to draw an analogy of the common features between the different industrial and academic revolutions. We have the first university revolution (University 1.0) which is characterized by a mode of learning limited to a privileged few. The second university revolution (University 2.0) is characterized by a massification of education with the democratization of access to knowledge. The third university revolution (University 3.0) represents the era of integration of digital devices as teaching and learning tools. The concept of the fourth university revolution (University 4.0) that we propose aims at applying the Industry 4.0 paradigm in universities to foster the automation, adaptation, and personalization of learning processes.

Universities 1.0.
Method of knowledge transmission: Students consume information provided by academic staff; traditional assessment in the form of exams;
Period of dominance: XIV – XVII centuries;
Context: University focused on intellectual activity;
Environment: Auditoriums, amphitheaters, (conferences, lectures, debates), libraries, archives;

Universities 2.0.
Traditional education does not change its essence, it is only modernized;
Period of dominance: Industrial revolutions, 18th century - beginning of the 20th century;
Context: Universities respond to the demands of industrial revolutions;
Environment: Combination of halls and auditoriums with laboratories;
With the release of *"Web 1.0",* education and universities were equipped with virtual systems of learning and transmission of knowledge; with the emergence of Web 2.0, universities began to take advantage of technology and use it to change traditional methods of learning and transmission of knowledge.

Universities 3.0.
Students began to take an active role in the entire process of transmitting and creating knowledge. The boundaries between lecturers, students, universities and different scientific disciplines began to blur; this process takes full shape and consolidates in the framework of Universities 4.0.
Context: Major changes in social realities, universities go beyond "rigid study or just photographing the real world";
Environment: The appearance of modern complex laboratories, technology parks, specialized pedagogical laboratories and related to development projects;

Universities 4.0. Learning 4.0.



University 4.0 establishes new, innovative, and personalized learning formats and approaches. It trains the citizens of the world through the internationalization of knowledge and the mobility of students and lecturers. In the digital age and in the face of technological evolution, economic turbulence, and social transformations, the university heralds the changes in society.

It envisages diplomas and qualifications that can fulfill the needs of the jobs of tomorrow, and witnesses the growth of "flexibility" influenced by the evolution of professions and the employer's expectations, focusing on the future. It aims at students' acquisition of universal skills to rethink, act, anticipate, and consider alternative solutions for complex future scenarios. It adopts an inter-sectoral practice that integrates interdisciplinary and interprofessional approaches as well as shared perspective, to maximize collaboration.

University 4.0. integrates generalized "Soft skills" modules, combining them with the emotional skills of adaptation, creativity, optimism, emotional intelligence, critical thinking, cognitive flexibility, judgment, negotiation, open-mindedness, and teamwork. Moving from "understanding to action" strengthens capacities to pass from learning to interaction with the real world. University 4.0 marks the transition from a teacher-centred pedagogic mode to a student-centered learning mode. It is, in itself, a new paradigm that integrates innovative pedagogical approaches and places the student at the centre of every concern. It aspires to educate more, quicker, better, cheaper, more convenient, and more independent of time and space. Learning is based on new technologies of online communication, electronic platforms, and the co-creation of knowledge.

All of these are pedagogical approaches and organizational challenges that reflect the changing role of the teacher from a "transmitter of knowledge and subject matter expert" to a role of "animator and learning advisor, guide of critical thinking, and facilitator of extraordinary information available to students."

Scientific research/exploration 4.0.

The transfer of scientific knowledge and technology to an activity of economic or social value is a major priority.

Research 4.0 highlights the entrepreneurial university that integrates economic and social development in its mission, reduces the distance between humanities, social, and technological sciences, carries out innovative and interdisciplinary scientific research to anticipate future trends and dynamics of technological and social development, environment, and more, by placing universities in a new position, starting from the development of skills, expertise, and service delivery up to the creation of new and innovative companies. It also takes the shape of innovation in processes, products, services, and solutions that enable businesses to reduce costs, increase sales, enter new markets, create and maintain jobs, and increase quality in line with market needs services, and new professions.

University 4.0. implements appropriate incentivizing structures and decision-making processes, and creates incentives that accompany/ encourage researchers to effectively produce, popularize, and "market" scientific and technological knowledge. Research 4.0. becomes an essential engine for the internationalization of the university's missions, and contributes to the efficiency, quality, and improvement of the university's visibility internationally. The university, thanks to its international influence in terms of production and transfer of science and technology, is quite attractive for students and talented and creative researchers, as it is for investors.

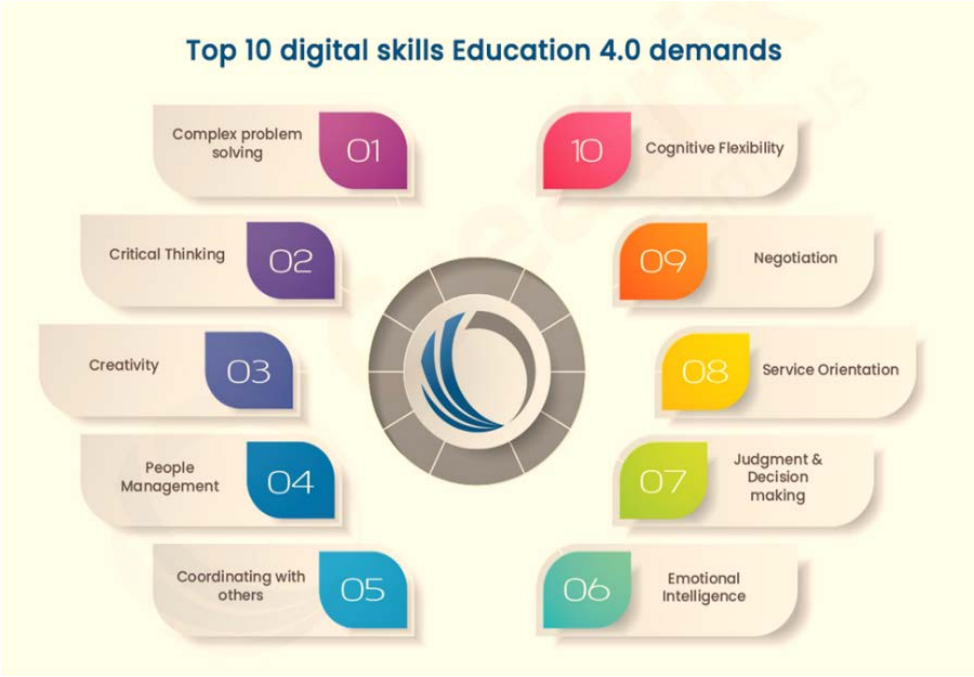
Governance/administration 4.0.

Flexible and proactive by integrating the culture of results with strengthening the culture of decision-making.

University 4.0. is a business, an employer, a key player in its sector and territory, and a partner of communities and public authorities. It is the place of creativity and the spread of knowledge, and an essential pillar of equal opportunity. The university can provide highly qualified, flexible, and innovative human resources. It promotes academic research and, the creation of scientific, technological, and cultural wealth, and contributes to economic and social development. At its head is a decision-making body endowed with full autonomy, which has the essential legitimacy to operate, as well as the agility needed to promote and accelerate innovative ideas and projects. The entrepreneurial university is financially autonomous. It is active in the sustainability of financial resources to realize its objectives and ambitions which are guided by innovation, advanced technologies, artificial intelligence, big data, start-ups, etc. An integral part of the organizational and governance practices of entrepreneurial universities 4.0. are also "Strategic planning, efficient management practices, evaluation of the quality of services and activities, resource efficiency, transparency and responsibility of each management structure, etc."

The "integrative" governing system inevitably leads to a culture of change and continuous improvement toward innovation and creativity, guarantees transparency and academic integrity of teaching and scientific research, and establishes managerial control of academic activity, performance, and career evaluation. University 4.0. becomes a centre of

innovation and technological knowledge that houses various companies and businesses, research centres, NGO institutions, etc.



The emergence of Industry 4.0, Services 4.0, and Administration 4.0 comes with a simple but categorical challenge: the degree is necessary but no longer sufficient, as it is not the "last stage of learning." University 4.0 forms and qualifies "leading actors," not mere spectators of changes. It realizes "personal development," creative and initiative skills to swiftly become part of business, management, scientific research, leadership, etc.

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Knowledge as a service: The case of Mind Genomics

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Abstract
This paper presents a study on a particular technology called Mind Genomics and its multiple applications in different activities such as business, academic processes, cultural, political, and social sciences. This technology is designed to be offered as a service and is part of the global digitalization process.
Mind Genomics is composed of a number of complex statistical models, data mining, and clustering technologies. The user does not have to understand nor be able to perform all the models included in this technology. The user must know only the services offered and provide the necessary data. The calculations are performed automatically and provided to the user for interpretation. The approach is sound, easy to use, and yet powerful.

Introduction
The active use of technology has been a reality in almost all areas of human activities for quite some time. Now, we are facing another technological challenge: transforming the digitalization reality to create a more competitive environment for business [1]. Part of the digital transformation is creating better and more efficient environments for extending the use of technology. This extension requires making substantial changes in the way technology is used. Extending the use of technology means making it easy to use by everybody.
In the scientific environments, engineers have a more solid background in mathematics, computer science than their colleagues in social and political sciences. For quite some time, electrical engineers pushed the research in computer science forward. Mathematicians have contributed significantly to developing faster algorithms and inventing new scientific disciplines such as Data Mining, clustering technologies [2], and Cryptography, to name a few.
On the one hand, the use of technologies by social and political scientists has been relatively slow and not holistic. This slowness in adopting new digital technologies comes from their background. On the other hand, social and political scientists must use advanced technologies to achieve depth and strength in their studies. These complex goals cannot be reached without a master of the advantages new technologies offer. Thus, researchers of social

and political sciences need to understand and use the large arsenal of opportunities offered using technology.

The contradiction between the need to use complex tools and the required background in technology social and political scientists are provided with can be solved successfully only if the required theoretical and technological knowledge is offered as a service. Thus, researchers in social and political sciences should not be obliged to master advanced topics in statistics, mathematics, and technology to use them successfully. Instead, they only need to know how to use tools and applications offered as services. In other words, they need only to know the interface to these tools and applications.

Software engineering uses with ample success a principle referred to as encapsulation; services offered by a class or a component are made public via their interface, and other components could use the encapsulated behavior only by knowing the existence of these services, not how these behaviors are implemented [3]. The combination of encapsulation and polymorphism is the pillar of modern software engineering [4].

The principle of encapsulation is used in our everyday life. When learning how to drive, instructors do not provide potential drivers with technical details of how the car engine works. All cars, cheap and expensive, have the same interface. Driving means knowing that if you press the gas pedal, the car will accelerate, and when you turn the stirring left, the car turns left, and so on. If technical details related to what happens to the engine when we press the gas pedal or the breaks pedal are necessary, only a few engineers can drive.

Efforts to use knowledge as a service are already pervasive. A number of researchers have pointed out the need for designing and implementing systems offering knowledge management services [5], [6].

Knowledge-as-a-service is a new and emerging research trend that constitutes a promising path for organizations aiming to achieve better customer support and decision-making across a wide range of content providers [5].

[6] Presents the prototype of a knowledge-sharing environment dedicated to Service Science development and dissemination. This proposed concept model of the Service Science Knowledge Environment (SS-KE) can be developed in three directions, i.e., research, education, and business alliances.

The race for high-speed development, followed by the need for high-quality production, brings to enterprises increasingly complex conditions in the rapidly changing environment. In the process of transformation from “production value growth” to “value-driven,” knowledge service plays an important role, which can both increase knowledge innovation capability and export heterogeneous knowledge to the outside world [7].

Knowledge management is a crucial issue in academic environments too. Knowledge management facilitates academic institutions to enhance the capacity to collect information and knowledge and apply it to problem-solving and decision-making [8].
This study introduces Mind Genomics as a new technology that can be of immense use to researchers in the political and social sciences field, especially by creating an easy-to-use yet powerful environment to enable quantitative approaches in both fields. Our experience using this technology in several studies makes us confident that it is an excellent technology and helps enormously conduct solid and in-depth analyses of how people make decisions in everyday life. Several studies will be presented to clarify the design and implementation of social and political experiments using Mind Genomics. Recommendations are made to the corresponding departments in academic institutions to familiarize their audiences with the concept of using technology as a service. Mind Genomics is an example of a knowledge-creating system that offers its usefulness as a service.

The Mind Genomics Approach

Mind Genomics is a new science with old roots; it reveals what aspects of the subject are essential to people, how people vary in the way they respond to these aspects (mindsets), and the messages most effective to drive preference and adherence for each mindset. Finally, it helps to identify the mindset of a person on a subject, either through personal interaction (the personal viewpoint identifier) or through scored databases (the digital viewpoint identifier) [9].
Mind Genomics is a data-driven approach to understanding the world of the everyday [10]. A metaphor for Mind Genomics is *the cartography of the mind*. Knowledge is developed in a pointillist style, from the intimate, profound, comprehensive understanding of specific subjects, be these situations (e.g., choosing a toothpaste brand), regimens (e.g., adhering to the proper schedule for taking one's drugs), choosing a service, products (e.g., selecting a clinic in which to give birth), dealing with the customer/patient with understanding (e.g., interacting with a teenage patient) [11].
Mind Genomics works at the level of the concrete, the granular. The Mind Genomics approach is Socratic, i.e., select a topic, select four questions or silos, and provide four alternative answers for each question. The answers should cover the entire spectrum of potential responses, from positive, neutral, and hostile. The Mind Genomics process can be considered as a systematized 'mixing' of ideas. The researcher defines the actual content of the ideas, the

'meaning' and 'implication' of the answer. Instead of using a Yes/No question, Mind Genomics creates a scenario by combining answers from different silos without repeating the same scenario twice [12]. The combination of scenarios is referred to as a vignette; the respondents provide an evaluation according to their feelings. Feelings are a form of thinking [13]. Each respondent is presented with 24 different vignettes. A vignette comprises 2-4 elements, at most one element or answer from each question. Evaluating a vignette means performing an observation. The 24 combinations are specified by an underlying experimental design, dictating the specific content of each vignette. Thus, the set of combinations is the permuted experiment design, which allows a single Mind Genomics experiment to cover many of the so-called 'design space' of possible combinations [10], [14].

For some time, there has been a vivid discussion in the contemporary literature regarding the most efficient scientific research approach to be used. There are currently two approaches primarily used by the scientific community: hypothesis-based and hypothesis-free approaches. Understandably, there are followers for each of the approaches.

Traditionally, the hypotheses-based is the most used approach by researchers. This approach tries to address a specific, measurable, and answerable question, which may be intermediate to its ultimate objective but essential to attaining it. A well-constructed hypothesis has several characteristics: it is clear, testable, and falsifiable. It serves as the basis for constructing a clear set of experiments that will allow acceptance or rejection.

The supporters of the hypothesis-free paradigm argue that they offer a better and more dynamic approach to the independent-dependent variable relationship. The more vocal defenders of this approach are [15] and [16]. Mind Genomics is a hypothesis-free approach.

Table 1. Silos and answers for the distance learning experiment.

Question 1 - How effective is distance learning?	
A1	Distance learning is not as effective as the face-to-face communication
A2	Distance learning is more an individual learning approach
A3	A3 Distance learning platforms are less friendly to use than social media (Facebook, Instagram)

A4	Distance learning is more appropriate for people that have a job
Question 2 - How interactive is distance learning?	
B1	Distance learning platforms do not favor immediate feedback from students
B2	Distance learning platforms are not helpful for students during web-seminars
B3	Distance learning platforms allow for interaction between professors and students
B4	Distance learning platforms push students towards rational thinking
Question 3 - How feasible is distance learning?	
C1	Distance learning platforms require high speed Internet
C2	Distance learning platforms operate with limited supportive infrastructure
C3	Distance learning platforms do provide enough support for labs, seminars and exam sessions
C4	Distance learning platforms provide full support to forums, quizzes, messages, announcements, audio & video recordings
Question 4 - What is the perspective of distance learning as a learning approach?	
D1	Distance learning platforms require the ability to upload and download files on and offline
D2	Distance learning platforms should provide interaction as in the classroom
D3	An online tutor is necessary (besides the lecturer)
D4	A better distance learning approach requires more infrastructures and human resources

Step 1 – Define the topic: In this step the purpose is to define the problem under study. The topic could be of any nature, from the social sciences, political sciences or from the business world.

Step 2 – Create the 'raw material' using the Socratic approach of question and answer(s): The raw material comprises a set of statements about the subject, describing a 'word picture.' The research requirement is that the researcher works within the scope of the topic, asking four questions that 'tell a story' and then providing four answers for each question. The questions represent "the pillars" of the study, the main issues on which the study is based and try to address. The answers are simple stand-alone phrases. Table 1 presents these questions and answers for the distance learning experiment.

The Socratic method of questions and answers becomes a simple way of organizing different types of ideas. The questions will never be used in the actual respondent-facing experiment. Instead, the questions (also known as silos or categories) are used to drive the production of the different answers (also known as elements.) Thus, the study develops as a dialog between Mind Genomics and the study participant. The answers are selected to represent the entire spectrum of potential answers, from negative, neutral, to positive. It is far easier to break the preparation into two parts developing questions that 'tell a story' (often considered the more challenging step), and then answering those questions with four alternative answers to each question (often considered the more straightforward step.)

Step 3 – Use an Underlying Experimental Design to Specify the Combinations of Answers: Mind Genomics works by mixing/matching answers from the different questions. The underlying experimental design ensures that the effort to create the combinations is thriving in a manner that is both not onerous to the respondent and enables the data to be analyzed using OLS (ordinary least-squares) regression [17].

The underlying design has been presented previously [10]; the design is a single structure, which calls for 24 different combinations or vignettes for this study. Each combination comprises at most one answer from a question, but in many vignettes, one or two questions do not contribute answers. These are incomplete combinations but tested alongside the complete combinations comprising exactly one answer from each question.

The experimental design ensures that each answer appears equally often across the set of 24 vignettes and that the 16 answers are statistically independent. Furthermore, the incompleteness of some vignettes in the design prevents multi-collinearity. Furthermore, the incompleteness of the vignettes ensures that coefficients emerging from the OLS regression will have absolute properties, not relative ones. If the vignettes were all to have precisely one answer from each question, a practice of most individuals using 'conjoint measurement' and experimental design, then the regression coefficients

would be relative, not absolute. The exercise would have very little value for an archival science where the values of the coefficients are to have meaning as the science grows.

Step 4 – Execute the study in the field: The Mind Genomics studies have been 'templated' so that they are easy to create and deploy. The traditional market research methods have been to ask people to participate, encouraging participation by such anodynes as '*your opinion counts*.' Waiting for the respondents to participate without coercion, such as membership in a panel, has, in the past decades, become increasingly an exercise in futility.

Step 5 – Prepare the Data for Analysis: The data are stored and prepared for regression analysis. The scale ratings are converted to a binary scale, 0/100. The response time remains as measured, the number of seconds (to the nearest tenth of a second) between the time the vignette appears on the screen and when the respondent keys in a rating.
The nature of the rating scale and the analysis required that the data be stored and analyzed by OLS (ordinary least-squares) regression.

Step 6 – Build the model. Our data comprised 1250 observations from the 24 systematically created vignettes for each respondent. Every respondent evaluated a unique set of 24 such vignettes, so we cannot average the ratings of the vignettes to get a sense of what ideas or messages work and what does not work. The more appropriate way is to create a model, either for the total panel or for the relevant subgroup (e.g., a specific age group). The model is expressed by the simple linear equation: $Y = k_0 + k_1(A_1) + k_2(A_2) \ldots k_{16}(D_4)$. The coefficients show the contribution of each element to the likelihood that the vignette will be rated '5'. The additive constant, ko, is a purely estimated parameter, showing the expected probability that a vignette will be rated '5' in the absence of elements. The additive constant is purely theoretical, serving a purpose, but not necessary to the understanding of the comparative performance of the elements.

Step 7 – Lay out the data in a matrix form and identify patterns in terms of which particular elements 'drive' the response. The results are represented in the form of a matrix. Each column of data represents the coefficients for the model estimated by putting ALL relevant respondents in the subgroup into a single pool of data and then running ONE OLS regression on all the data of the group of relevant respondents. Thus, for Age 15–24, we compute only one OLS regression, incorporating all the relevant data.

Step 8 – Uncover Mindset segments from the total population: One of the critical objectives of Mind Genomics is to uncover new-to-the-world groups of ideas or people which provide a unique and identifiable focus. We introduce mindsets here as part of the way we classify the respondents. We create these mindset segments by clustering coefficients [28]. We begin by creating the model for each respondent so that we create 50 individual models. This is made possible by how we set up the study, which was to create the vignettes from each respondent using an underlying experimental design. The benefit is that now we create a model for each respondent separately. We store the 16 coefficients, not the additive constant, and then cluster the 50 respondents using the pattern of their 16 coefficients.

We generated two and then three clusters, so-called mindset segments. The two-cluster solution did not make sense and was challenging to interpret, so we discarded it. The three-cluster solution made sense in terms of interpretation, so it becomes the basis for the subsequent analysis of 'what these data suggest about personality.' Clustering is a well-established approach [2].

Step 9 – Link Response time to the elements: In the history of experimental psychology, the measurement of response time (also known as reaction time) occupies a revered place. First suggested by the pioneering experimental psychologist Wilhelm Wundt [18], response time was thought to signal something about the underlying psychological processes. Long response times were believed to be associated with unknown internal mechanisms, such as consideration of the message, efforts to block the message, and so forth. Often, however, the specific internal mechanisms were not elaborated.

Mind Genomics incorporates the measure of response time to assess the degree to which the message 'engages attention,' resulting in increased processing time, thus increasing the response time. Once again, the benefit of experimental design at the individual respondent level becomes apparent. One can measure the response time to a set of vignettes. Knowing exactly how the vignettes were structured enables one to relate the presence/absence of the individual elements to the response time. The outcome is the estimated number of seconds of response time that can be traced to the presence of the answer or element in the vignette.

The model for response time is the same as that used to relate the binary value to the presence/absence of the 16 answers. The only differences are that the response time becomes the dependent variable, and the equation has no

additive constant. The rationale for abandoning the additive constant is that there is no response in the absence of answers (elements in the vignette), and therefore the dependent variable is always 0.
In addition, Mind Genomics measures the Index of Divergent Thought [19]; [20]. The IDT evaluates the mindsets to demonstrate how participants react toward the pillars of the study under investigation. This evaluation method shows how things are going: what works and what does not, related to the matter.

Mind Genomics Applications

A number of studies have been undertaken using the Mind Genomics approach in different areas of human activities. Next are listed just a few to demonstrate the approach's power and versatility. Each experiment demonstrates the process of using Mind Genomics to collect data from interviewees, analyze them, and store the acquired results in the database. Thus, the knowledge obtained is stored, and it is ready to be used at any time the researchers need this knowledge.
[21] Presents a detailed study of the consequences of Covid-19 on the tourism industry in Albania. This study shows that the qualifications criterion Reason: ***patriotic tourism - staying in Albania*** was rated the highest with a total score of 27 and an additive constant of 43. This item had 1512 observations, demonstrating that this is an essential issue for most people. Data from the National Institute of Statistics (in Albania) show that the concept of "patriotic tourism" is of significant relevance. Tourists from Kosova came to the rescue of the tourism industry of Albania. Over a million tourists from Kosova visited Albania during the summer. A considerable number of people from the Albanian diaspora as well, joined the Albanian Kosovars, to give a boost to the local tourism industry during the difficult times of Summer 2020.
Overall, the most statistically relevant answer is ***No vacations as the majority of institutions forced people to use their holidays during the quarantine time*** evaluated with 6, showing the gloomy picture created by the pandemic. The element: ***No Summer holidays in 2020, a lot of Albanians lost their jobs because of the quarantine*** is evaluated with 4, illustrating the country's difficult economic situation; people are not even considering having a vacation.
[22] Makes a general presentation of the Mind Genomic approach used in the field of marketing; it provides valuable insights on how to build a Mind Genomics experiment to collect point of views of customers regarding a particular product or service.

[12] Resents one of the first studies focusing on the Distance Learning approach during the Covid-19 pandemic. Results suggest that distance learning will shift many of the responsibilities formerly on the professors to those of the students. The data suggest the need for emotional support during this transition, specifically to maintain interaction among students and professors as well as among students themselves in distance learning platforms as in traditional classrooms. The study shows that this new paradigm's effectiveness and interactivity are crucial, and any further developments in distance learning should support these components strongly. The position of the professor is indispensable as the guide to the entire process, suggesting that at the time of this writing (2020) distance learning approach is perceived only to be an intermittent complementary path to in-person interactions.

Another study was undertaken using the Mind Genomics approach to analyze the phenomenon of corruption in education [27]. This study interviewed respondents from four countries (Albania, Hungary, India, and the USA), looking at the linkages between corruption by country and other factors such as social class. Based on the collected data, a model is generated for each group (country, type of person), showing how the person in the group is likely to call a description 'corrupt,' and how each particular element from the set of 20 elements related to education adds or subtracts to that fundamental proclivity to call a situation or behavior corrupt.

The issue of how a person is perceived as radical is studied in detail by [24]. A large sample of participants, about half Muslims, and half non-Muslims, evaluated different sets of vignettes about beliefs, intending to 'predict' whether the person described in each vignette would be or not radicalized. The respondent also selected the likely emotion to be felt. The results suggest a low fundamental belief in the radicalizability of the described person according to non-Muslim respondents and a firmer fundamental belief in radicalizability by the Muslim respondent. The non-Muslim respondent differentiated strongly among the different elements regarding prospective radicalization indications and linked three emotions to the vignettes (belong, identify, master).

A holistic presentation of Mind Genomics applied to social and political sciences is presented by [25]. This book offers rich data combined with a new methodological approach and fresh analytical insights, which helps to understand society's complex reality better. Covering topics such as human thought, decision making, and cognitive science, this premier reference source is a dynamic resource for political scientists, sociologists, psychologists, business leaders, marketers, government officials, journalists, students, and

faculty of higher education, libraries, doctoral and postdoctoral candidates, researchers, and academicians.

Applications of Mind Genomics in law are presented by [26]. The book featured a then new-to-the-world approach called rule-developing experimentation (RDE). Using systematic experiments, RDE uncovers the decision criteria people use when evaluating alternatives in their quotidian, daily life. RDE discovers these rules by quite simple, repeatable, robust procedures.' Good ideas do not necessarily spring up in one place, nor did the application of RDE to the law originate in that visit. A zeitgeist, a spirit of the times, pervades science so that the same idea manifests itself to various people who are interested in a topic area. This book represents the collaboration between lawyers and scientists, academics, and businesspeople. It is an excellent example of using complex statistical models, data mining, and Internet technologies in law.

Conclusions

Mind Genomics is a new science that explains how people make their decisions about their everyday life events. It represents a combination of several technologies such as statistical modeling, data mining, clustering and the Internet-based technologies offered as a service. It allows to design complex experiments in any areas of activities such as business, social and political sciences and education.

Mind Genomics can help design and implement complex studies. The users have only to conceive the experiment and easily implement it. This approach especially is of value to social and political scientist as it enables them to use sophisticated models without being obliged to understand how these models work and are implemented. Users have only to understand what the requirements of Mind Genomics are, design an experiment, provide the data to the system- and the rest is performed automatically by the Mind Genomics system. Currently, all aspects of the modern society are involved in the process of digitalization. Creating knowledge and furthermore managing this knowledge should be an easy process, so everybody should benefit from the global digitalization process.

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Albania - digital economy and the transition towards the ecosystem of circular economy

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The transformation of the traditional economy into a circular economy brings has brought about important transformations in the economy and society. This transformation, coupled with the rapid developments of digital technology, has developed concepts and processes that have led to a redevelopment of the global economy. These concepts are viewed as very visionary approaches that promote the redesign of production, the use of sustainable materials, the minimization of waste, the return of wastes to the economic cycle, that are changing the way we live, produce, think and act. Understanding these concepts and their impacts on the economy is essential for both researchers and policy makers, who are engaged in designing future policies. It should be emphasized furthermore that digitization is a driving force towards a circular economy ecosystem. Although Albania is in the initial stages of transition from a linear economy to a circular economy, but considerate development of digitalization, it seems that there is a commitment to move further into the full understanding of the circular economy concept.
Keywords: digitalization, circular economy, information technology, ecosystem

Circular Economy, Ecosystem, and Digitalization

Digital economy, ecosystem, and circular economy are interconnected concepts that can contribute to sustainable development. *The digital economy* refers to economic activities that are based on digital technologies, such as e-commerce, digital services, and online platforms, that have been growing rapidly in recent years, creating new job opportunities and contributing to economic growth. The *ecosystem* refers to the interconnectedness of various sectors, businesses, and stakeholders within the country's economic system that involves collaboration, innovation, and the exchange of resources and knowledge among different actors. The *circular economy* as an economic model aims to minimize waste and maximize resource efficiency, promoting the reuse, recycling, and regeneration of products and materials rather than the traditional linear model of take-make-

dispose. The digital economy can play a significant role in promoting a circular economy and fostering a sustainable ecosystem. Here's how the digitalization concept intersects with the ecosystem and circular economy: *Digital platforms* and services can facilitate the sharing economy and collaborative consumption, which are key components of a circular economy. Sharing platforms for transportation, accommodation, and other resources can optimize resource utilization and reduce waste. These platforms can facilitate the collection and analysis of data related to resource use, waste generation, and environmental impact. This data can inform decision-making and policy development for a more sustainable and circular economy. *Digital technologies* can enable better tracking and management of resources and materials throughout their lifecycle. This can help businesses and consumers make more informed decisions about resource use, recycling, and waste management.

E-commerce and digital marketplaces can promote the sale and exchange of second-hand goods, extending their lifespan and reducing the need for new production.

Digital solutions can support the implementation of circular business models, such as product-as-a-service or remanufacturing. These models focus on maximizing the value and lifespan of products, reducing waste, and promoting resource efficiency.

Circular Economy

Circular economy is a relatively new concept that was defined as: Pearce, D., & Turner "Everything is an input into everything else. Simply saying that the end purpose of the economy is to create utility and to organize the economy accordingly is to ignore the fact that, ultimately, a closed system sets limits, or boundaries, to what can be done by way of achieving that utility."

Graedel & Allenby suggested that "The goal of industrial ecology is to accomplish the evolution of manufacturing to a system in which all wastes are recycled. Understanding of the potential to reach this goal, and the environmental risks and benefits, is needed."

MacArthur Foundation emphasized "What will it take to transform our throwaway economy into one where waste is eliminated, resources are circulated and nature is regenerated? The Circular Economy gives us the tools to tackle climate change and biodiversity loss together, while addressing important social needs. It gives us the power to grow prosperity, jobs and resilience while cutting greenhouse gas emissions, waste, and pollution."

The concept of Circular Economy although being new, is developing so fast and is extended further as:

Green Economy that has similar target to the Circular Economy, which is to avoid exposing future generations to significant environmental risks and the economic shortage, but seeks economic growth that does not negatively impact people or the environment.
Blue economy – is a component of Green economy but the blue economy is being focused on sustainable use of ocean, marine and coastal resources, while eliminating sea pollution, including pollution from water transport equipment Circular economy nowadays is the main focus of all international institution and organizations that have adopted their agendas including action plans to transit to Circular Economy as for example:

- March 2020, the European Commission approved a full action plan transitioning to Circular Economy;
- March 2022, the European Commission undertook the first package to perpetrate the transition toward the Circular Economy, as part of the action Plan of 2020;
- European parliament on February 2021 approved the regulation on action plan of the Circular Economy;
- April, 24, 2022, defined the Circular Economy as a model of production and consumption on its.
- July 2, 2021, UN defined that everything left should be reused, reprocessed, and in case of none of them is possible should be recycle as source to produce energy.
- 2017, "The strategy of EU for Adriatic-Ionian region", is furthered by an action plan of each country. [i]

Digitalization and Circular Economy
Digitalization and Circular economy are two interconnected concepts where digitalization can act as an enabler and accelerator of the circular economy.

Digital era – changes of the politics
The digital era has brought about significant political changes, transforming the way governments operate and citizens engage in political processes. Some of the key political changes in the digital are:

1. Increased access to information: The internet and digital technologies have democratized access to information, allowing citizens to easily access news, research, and government documents. This has empowered individuals to be more informed and engaged in political discussions and decision-making processes.

2. Rise of social media and online activism: Social media platforms have become powerful tools for political mobilization and activism. Movements on clime changes, environmental protection etc., have utilized social media to organize protests, raise awareness, and challenge governances.
3. E-government and digital governance: Governments have embraced digital technologies to improve service delivery and enhance transparency. E-government initiatives have made it easier for citizens to access government services online, reducing bureaucracy and increasing efficiency. Digital governance practices, such as open data initiatives, have also promoted transparency and accountability.
4. Cybersecurity and privacy concerns: The digital era has brought about new challenges in terms of cybersecurity and privacy. Governments works hard to adapt their policies and regulations to address these concerns, balancing the need for security with the protection of individual rights. Issues like data breaches, surveillance, and online censorship have become central to political debates.
5. Disinformation and fake news: The proliferation of digital platforms has also led to the spread of disinformation and fake news to manipulate public opinion. Governments have had to grapple with the regulation of online content and the promotion of media literacy.
6. Digital divide and inequality: While the digital era has brought numerous benefits, it has also exacerbated existing inequalities. The digital divide, characterized by unequal access to digital technologies and internet connectivity, has widened the gap between the digitally empowered and marginalized populations.
Overall, the digital epoch has reshaped political landscapes, challenging traditional power structures and enabling new forms of citizen participation. Governments have had to adapt to these changes, embracing digital technologies while also addressing the associated challenges.

Digitalization and Circular Economy
Digitalization and the circular economy are two interconnected concepts that have the potential to drive sustainable development and address environmental challenges as follows:

1. Digitalization enables the collection, analysis, and utilization of vast amounts of data. This data can be used to gain insights into resource consumption, waste generation, and environmental impacts. By leveraging this information, businesses and governments can make best decisions to optimize resource use, reduce waste, and promote circular practices.

2. Digital technologies, such as the Internet of Things (IoT) and artificial intelligence (AI), can be employed to monitor and optimize resource consumption in various sectors. For example, smart grids can optimize energy distribution, while AI algorithms can optimize logistics and supply chains, reducing material waste and energy consumption.
3. Digitalization can facilitate the transition from linear to circular business models. Through platforms and digital marketplaces, companies can engage in activities like product sharing, remanufacturing, and recycling. Digital platforms can connect consumers with products and services that are designed for durability, reparability, and reuse, promoting a circular economy.
4. Digital technologies can enhance traceability and transparency in supply chains, enabling better tracking of materials and products throughout their lifecycle. This transparency can help identify inefficiencies, detect counterfeit products, and ensure compliance with environmental regulations. It also enables consumers to make more informed choices, supporting sustainable consumption.
5. Digital platforms have facilitated the growth of collaborative networks and sharing economy models. These models promote the sharing, renting, and swapping of resources, reducing the need for ownership and minimizing waste. By connecting individuals and businesses, digital platforms can optimize resource utilization and promote circular practices.
6. Digitalization can support the implementation of extended producer responsibility (EPR) schemes. EPR requires producers to take responsibility for the entire lifecycle of their products, including collection, recycling, and proper disposal. Digital technologies can enable efficient tracking and management of products, making it easier for producers to comply with EPR regulations.

> *Overall, digitalization can act as an enabler and accelerator of the circular economy. By leveraging digital technologies, businesses and governments can optimize resource use, promote circular business models, enhance transparency, and foster collaboration, leading to a more sustainable and circular future.*

OECD on March 28, 2022, emphasized that "Digital technology (IA, block chain, Internet of Things, Cloud computing etc.) makes easier transition toward Circular Economy with the most effective resources, helping with the inputs of the new business models and offering most effective politics."
Studies have emphasised the role of digitalization on fastening the transition to Circular Economy.

World Economic Forum (August, 25, 2022)[ii] emphasised: "To create a fully circular business model, digital business ecosystems must be designed to make significant decisions and take action. While companies ratchet up their digital processes, they must simultaneously implement circular business models and use digitalization to create durable, interoperable ecosystems that support circular ambitions and create new opportunities for innovation, differentiation, synergies and jobs. Developing this inherent virtuous circle of economics will produce efficiencies, savings and additional profits. A digital backbone for the circular economy will have a similar impact on accelerating competitive circular business models and putting global climate goals within reach. It is now time to collaborate on a digitalized ecosystem that is competitively and commercially neutral, that facilitates differentiation and innovation for each company and ensures seamless digital interoperability for any ecosystem participants." World economic Forum concludes that TIME IS NOW.

Deloitte: "To benefit from a digitalized ecosystem while protecting against a centralized digital platform owned by a dominant player, incumbents must realize that accelerates the transition and reduces time, cost and risk in implementing circular business models. Recent history shows how the emergence of shared cross-industry backbones has enabled innovation and differentiation in a business ecosystem without monopolizing the foundational infrastructure."

Gartner: "By 2029 Circular Economy is expected to replace linear economies, and that comes with consequences for supply chain leaders. Consumer increasingly want organizations to focus more on sustainability, the reduction of waste, green energy, and environment-friendly initiative and transformations.[iii] Circular economy and ecosystem –starting simple moving to intelligent collaboration when starting to shape intelligent ecosystems."

Digital Economy and Albania – Reshaping the Linear Economy to Circular Economy

To promote the integration of digital economy, ecosystem, and circular economy in Albania, it is important to foster collaboration among different stakeholders. This involves partnerships between digital businesses, government agencies, research institutions, and civil society organizations. Additionally, supportive policies and regulations, investment in digital infrastructure, and education and awareness campaigns can further drive the adoption of sustainable practices and circular economy principles in Albania's digital ecosystem. Albania has been making efforts towards promoting a more

sustainable and circular economy, including the development of its ecosystem, refers to the interconnectedness of various sectors, businesses, and stakeholders within the economic system.

In the context of a circular economy, Albania has recognized the importance of transitioning from a linear model of production and consumption to a more circular approach. This involves reducing waste, maximizing resource efficiency, and promoting the reuse, recycling, and regeneration of materials and products, but although it is on the initial phase of transforming the linear economy to circular economy.

Nevertheless, that initial efforts on the recycling started in the period 1980-1990 the real concept of Circular Economy is developed last years. Last development and events are even fastening and give better understanding of the transition process toward the model of Circular Economy:

Digitalization is helping nowadays to better understanding and starting to work toward this transition.

Covid-19 and post Covid period, forces the changes of the traditional economic model: New business model was built to help business continuation as well as modification of the existing one were forced to prosper. This situation brought the revaluation of the usages of the digitalization of the businesses processes;

Digitalization is helping on modernization of the Albanian economy raising its processing standards.

Financial sector is one of the most advance sector on digitalization, mainly because most of the banks are international banks that follow the same standards whenever working.

The economic sector of Business Process Outsourcing is also developed but is accompanied with management higher risks on their digitalization plans;

Tourism sector is to the turning points because they understood the digitalization needs and are very optimists for the near future development.

Agriculture presents the lowest digitalization level nationally and investment in this sector are very low.

Albania has understood the problems faced on the digitalization process, and it is working on solving them in close collaboration with IT specialist from other countries. Findings show that on digitalization Albania's situation is as follows: Albanian companies invest on system digitalization mainly for digital marketing, electronic trade, digital payments, etc.

Mostly used software are those of finance and accounting as well as digital payments. The least used software are those of the input chain management.

The Government of Albania is investing on digitalizing the government services, pushing that other actors to follow this trend. Legal regulation on

securing personal data, increasing the securities of digital transaction, digital trade, digital identification etc. needs a lot more to be done.
The businesses barriers identified to be more involve in digital processes has to do with:

- Limited budget
- Lack of technical capacity
- Lack of the digital strategy development

The digital economy has been growing rapidly worldwide, and Albania is no exception. In recent years, Albania has witnessed a significant increase in digitalization and the adoption of digital technologies across various sectors.
The digital economy in Albania encompasses a wide range of activities, including e-commerce, digital services, software development, and IT outsourcing. The country has seen a rise in online businesses, digital startups, and the use of digital platforms for transactions and communication.
The digital economy has brought several benefits to Albania. It has created new job opportunities, especially in the IT sector, and has contributed to economic growth. Digital technologies have also improved efficiency and productivity in various industries, making businesses more competitive.
Furthermore, the digital economy has facilitated access to information and services for Albanian citizens. It has enabled the provision of online government services, e-learning platforms, and digital healthcare solutions, among others. This has enhanced convenience and accessibility for individuals and businesses alike.
To further develop the digital economy in Albania, there are several areas that need attention.
Firstly, there is a need for continued investment in digital infrastructure, such as high-speed internet connectivity and data centers. This will ensure that businesses and individuals have reliable access to digital services.
Secondly, there is a need to focus on digital skills development. Enhancing the digital literacy of the population and providing training programs in digital technologies will help individuals take advantage of the opportunities offered by the digital economy.
Thirdly, fostering innovation and entrepreneurship in the digital sector is crucial. Supporting digital startups, providing access to funding, and creating a favorable regulatory environment can encourage the growth of innovative digital businesses in Albania.
Lastly, ensuring cybersecurity and data protection is essential for the digital economy. Establishing robust cybersecurity measures and implementing data protection regulations will build trust and confidence in digital transactions and services.

Overall, the digital economy presents significant opportunities for Albania's economic development. By investing in digital infrastructure, promoting digital skills, fostering innovation, and ensuring cybersecurity, Albania can continue to harness the benefits of the digital economy and drive sustainable growth.

While the digital economy is developing although the faced problems and lack of capacities, government is working hard to foster a circular economy ecosystem in Albania. Several initiatives and strategies have been implemented in order to speed up that transition, such as:

1. **Policy and regulatory frameworks:** Albania has been working on developing policies and regulations that support the transition to a circular economy. This includes waste management regulations, incentives for recycling and resource efficiency, and promoting sustainable production and consumption practices. May 27, 2020 national plan of integrated strategy of the wastes for the period 2020-2035 is approved and aims:

- Transition from linear economy to circular economy
- To build the frame and institutions to connect all actors and operators.
- To plan to prevent and reduce negative impacts on human health, environmental protection and adaption to climate change. [iv]

2. Waste management and recycling: Albania has been investing in waste management infrastructure and promoting recycling initiatives. This includes the establishment of recycling centers, waste separation programs, and awareness campaigns to encourage citizens to recycle and reduce waste.

3. Circular business models: Albania is encouraging the adoption of circular business models, such as product-as-a-service, sharing platforms, and remanufacturing. These models focus on extending the lifespan of products, reducing waste, and promoting resource efficiency.

4. Innovation and research: Albania is investing in research and innovation to develop new technologies and solutions that support the circular economy. This includes research on sustainable materials, waste-to-energy technologies, and eco-design practices.

5. Collaboration and partnerships: Albania is fostering collaboration between different stakeholders, including businesses, government agencies, and civil society organizations. This collaboration aims to share knowledge, resources, and best practices to accelerate the transition towards a circular economy.

6. Education and awareness: Albania is promoting education and awareness campaigns to inform citizens and businesses about the benefits of a circular economy. This includes educational programs in schools, workshops, and seminars on sustainable practices.

By developing a circular economy ecosystem, Albania aims to reduce environmental impact, create new economic opportunities, and improve resource efficiency. The country recognizes the importance of collaboration, innovation, and policy support to achieve these goals.

Transitioning from a linear economy to a circular economy requires a comprehensive and systematic approach and setting clear and measurable goals and targets, for transitioning to a circular economy. Here are some recommendations to facilitate this transition:

Setting targets for reducing waste generation, increasing resource efficiency, and promoting circular business models. These goals will provide a roadmap for action and help track progress. Landfills legislation should be focused on environmental protection. Stable policies for waste treatments are needed. Incinerators technology should be very carefully selected.

Foster collaboration and partnerships: Transitioning to a circular economy requires collaboration among various stakeholders, including businesses, governments, NGOs, and consumers. Foster partnerships and collaborations to share knowledge, resources, and best practices. Engage in multi-stakeholder dialogues and initiatives to drive collective action.

Create supportive policy frameworks: Governments play a crucial role in facilitating the transition to a circular economy. Developing and implementing supportive policy frameworks that incentivize circular practices and discourage linear approaches, could include regulations on waste management, extended producer responsibility, and incentives for circular business models. Economic stimulus should be used for the producer who brings green products to the market or supports recycling schemes. Public procurements should have strict requirements for goods and services friendly to environment throughout their life cycle.

Promote innovation and research. This involves encouraging research and development in circular economy technologies, processes, and business models; supporting innovation by funding programs, grants, and partnerships; fostering a culture of innovation and entrepreneurship that promotes circular solutions; introducing circular economy education on all education level, inclusion of citizens on wastes operation management etc.

Raise awareness and educate stakeholders, by: Educating and raising awareness among businesses, consumers, and policymakers about the benefits and opportunities of a circular economy. Highlighting the environmental, economic, and social advantages of circular practices. Providing training and capacity-building programs to help stakeholders understand and implement circular approaches.

Invest in infrastructure and technology: Investing in necessary infrastructure and technology to support circular practices, could include recycling facilities, waste management systems, and digital platforms for resource optimization and sharing; also investment in circular startups and businesses should be encouraged.

Encourage sustainable consumption and behavior change, by: Promoting sustainable consumption patterns among consumers; encouraging behavior change through awareness campaigns, labeling schemes, and incentives for eco-friendly choices; encouraging businesses to adopt circular business models that prioritize durability, reparability, and reuse.

Monitor and evaluate progress, by: Establishing monitoring and evaluation mechanisms to track progress towards a circular economy; regularly assessign the impact of policies, initiatives, and projects; using data and indicators to measure resource efficiency, waste reduction, and circularity levels.

Regional planning must be done with citizen's participation on integrated wastes management as well as coordination of hazard wastes managements on urban areas.

Learn from best practices and success stories, by: Studying and learning from successful circular economy initiatives and projects around the world; identifying best practices and adapt them to local contexts; sharing knowledge and experiences to accelerate the transition.

Albania should continue to adopt step by step the EU directives about Circular Economy, foster international cooperation and recognize that the transition to a circular economy is a global challenge. The country must foster international cooperation and collaboration to share experiences, knowledge, and resources, and engage in global initiatives and partnerships to drive collective action and address global environmental challenges.

Transitioning to a circular economy requires a collective effort and long-term commitment. By implementing these recommendations, stakeholders can contribute to a more sustainable and circular future.

In the meanwhile, the Government should enhance digital capacity in Albania, adapting policies on building the needed framework to promote capability on digital skills following the Co-plan "Circular economy report in the focus of the EU 2020."". In this regard, more must be done on:

1. Improve digital infrastructure: Invest in the development and expansion of digital infrastructure, including high-speed internet connectivity and reliable telecommunications networks. This will ensure that individuals and businesses have access to the necessary digital tools and technologies. It should secure to exploit the potential of last developed technologies as Big

Data, AI, Cloud Computing, Cyber Security, Black chain, Internet of Things, Digital market, #D Printing, Drones, Robots, Virtual reality, Augmented Reality.

2. Promote digital literacy and skills development: Implement comprehensive digital literacy programs to enhance the skills and knowledge of the population. This should include training on basic digital skills, such as using computers and the internet, as well as more advanced skills like coding, data analysis, and cybersecurity. Government investment in education should be increased to teach or reoriented the existing capacities toward new technologies.

3. Support digital entrepreneurship and innovation: Foster an environment that encourages digital entrepreneurship and innovation. Provide support programs, funding, and mentorship opportunities for startups and digital businesses. Create incubators and accelerators to nurture and grow digital ventures. Government should support the development of the private businesses on digitalization and should see the development of the government and private sector as one in development strategy.

4. Enhance e-government services: Invest in the development and improvement of e-government services to make them more accessible and user-friendly. This includes online platforms for government services, digital identification systems, and electronic document management. Encourage the use of digital platforms for citizen engagement and participation in decision-making processes.

5. Strengthen cybersecurity measures: Enhance cybersecurity measures to protect individuals, businesses, and government systems from cyber threats. This includes implementing robust cybersecurity frameworks, promoting awareness of cyber risks, and providing training on cybersecurity best practices.

6. Foster collaboration and partnerships: Encourage collaboration and partnerships between the government, private sector, academia, and civil society organizations. This can facilitate knowledge sharing, resource pooling, and joint initiatives to enhance digital capacity.

7. Support research and development: Invest in research and development in digital technologies and innovation. Support academic institutions and research centers to conduct research on emerging technologies and their applications. Encourage collaboration between academia and industry to drive innovation.

8. Promote digital inclusion: Ensure that digital capacity-building initiatives are inclusive and reach all segments of society, including marginalized communities, rural areas, and vulnerable populations. Provide access to digital

tools and training programs for underserved groups to bridge the digital divide.

9. Encourage digital collaboration and knowledge-sharing: Foster a culture of collaboration and knowledge sharing among digital professionals and organizations. Encourage participation in digital communities, forums, and conferences to exchange ideas, share best practices, and learn from each other.

10. Monitor and evaluate progress: Establish monitoring and evaluation mechanisms to assess the impact of digital capacity-building initiatives. Regularly review and update strategies based on feedback and lessons learned. Use data and indicators to measure the effectiveness of digital capacity-building efforts.

11. Schools and universities should offer contemporary curricula and programs to be able to support market requirement on the new technologies.

By implementing these recommendations, Albania can enhance its digital capacity, promote digital inclusion, and leverage digital technologies for economic growth and social development.

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Digital Banking: The Continued Growth of Digital Transformation in the Banking Industry - Case Albania

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Abstract
In recent years, digitization, technology, and analytics have become integral to every economic sector, including the banking industry. Worldwide, banks have had no option but to adopt digital banking practices in a majority of their operations. Consequently, the significance of differentiating between 'traditional' banking and other forms of banking has increased.
Companies such as Big Tech and Fintech have provided another way to approach clients and banking systems. The way forward to adapt with the use of new technologies has its benefits and its drawbacks. In the digital world, technologies as mobile banking, artificial intelligence, cloud, blockchain allows the banking businesses to improve the customer experience, financial operations or generate new business models. However, as the technology is evolving so fast, banks need to switch systems and applications frequently but this is a costly process. Quality of the services is just as important as the price of services.
Banks must be able to supply high-quality services and products, exceptional experience and good price in order to satisfy the demand. Banks are approving new technology that assist in analyzing the prospect and foresee the potential results with predictive data analysis. As the acceleration of the digital transformation continues, the capacity to distinguish in between banking leaders rely on holistic approach to digital transformation, investments in data and analytics to drive innovation, smarter resource management and talent development, new ways of working and real-time strategic planning. (PwC, 2022)

Keywords Digital banking; Digitalization; Digital transformation; Technology
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1. Introduction

Digital transformation has become the new normal in the banking sector. The use of technology and analytics has become a key factor in the growth and success of banks. With the rise of digital banking, customers now expect

seamless and convenient banking experiences that meet their needs. Digital banking offers a wide range of services that traditional banking cannot match, such as mobile banking, digital wallets, and online banking.

Digital banking has revolutionized the banking industry, offering a wide range of services that traditional banking cannot match. With the rise of digital transformation, banks are investing heavily in technology to improve their operations and meet the evolving needs of customers.

Mobile banking is one of the most popular digital banking services. Customers can access their bank accounts and conduct transactions from their mobile devices, anytime and anywhere. Mobile banking offers convenience, flexibility, and real-time information, enabling customers to manage their finances easily. Digital wallets are another popular tool used in digital banking service that allows customers to store and use their credit and debit card information on their mobile devices. Customers can use digital wallets to make payments, transfer money, and even earn rewards (Megargel, A., Shankararaman, V., & Reddy, S. K. 2018).

Online banking is also a key digital banking service that enables customers to access their bank accounts and conduct transactions over the internet. Online banking offers convenience, speed, and security, and is increasingly becoming the preferred method of banking for many customers. In addition to these services, digital banking also enables banks to offer personalized and targeted services to their customers through data analysis and artificial intelligence. Banks can use customer data to offer tailored financial products, personalized offers, and financial advice. Digital transformation has become crucial for banks to remain relevant and competitive in the market (Peppard, J. 2000).

Banks that embrace digital transformation can improve their operations, reduce costs, and offer innovative services that meet the evolving needs of customers. The rise and rise of digital transformation in the banking sector is a testament to its importance and potential impact on the industry. These services enable customers to access their accounts, transfer funds, pay bills, and perform other banking activities anytime, anywhere. Digital banking has also made it possible for customers to conduct transactions using their mobile devices, which has significantly reduced the need for physical bank visits. In addition to provide convenience to customers, digital banking has also enabled banks to improve their operations, reduce costs, and generate new revenue streams. Banks can now use artificial intelligence and predictive analytics to analyze customer data, detect fraud, and manage risk more efficiently. The use of cloud computing has also enabled banks to store and access large amounts of data more easily, while blockchain technology has

facilitated secure and transparent transactions (Paul, L. R., Sadath, L., & Madana, A. 2021).
Moreover, the emergence of Big Tech and Fintech companies has disrupted the traditional banking industry by providing alternative forms of banking. These companies have leveraged technology and innovation to create new products and services that challenge the status quo. For example, some Fintech companies have created mobile banking applications that provide personalized financial advice and help customers manage their finances more effectively.

2. Digital Transformation, Artificial Intelligence, Cloud Computing and Blockchain Technology

Furthermore, digital transformation has enabled banks to create new business models that were not possible before. Fintech startups, for example, have been able to leverage digital technologies to create innovative financial products and services that challenge traditional banks. In response, traditional banks have partnered with Fintechs, acquired them or developed their own digital solutions to remain competitive in the market (Cortet, M., Rijks, T., & Nijland, S. 2016).
Digital transformation has also brought significant improvements in regulatory compliance, risk management, and fraud prevention. Banks can now use data analytics to identify and address potential risks and compliance issues proactively. They can also use blockchain technology to enhance the security and transparency of transactions, reducing the risk of fraud.
The adoption of digital transformation is essential for banks that want to remain competitive and meet the evolving needs of their customers. However, it is important to note that digital transformation presents significant challenges as well. For example, banks need to ensure that they have the necessary talent and resources to implement and manage new technologies. They also need to address the risks associated with cybersecurity and data privacy to protect their customers' data.
Overall, the benefits of digital transformation outweigh the challenges, and banks that embrace this evolution are likely to succeed in the long run. The banking industry in Albania has already experienced significant changes as a result of digital transformation, and it is expected to continue to evolve in the coming years. As such, it is important for banks in Albania to continue investing in digital technologies, talent development, and strategic planning to remain competitive and deliver innovative solutions to their customers. Customer satisfaction in today's marketing era is believed to be strongly

related to understanding the pattern of consumer interest and purchasing experience (Ilollari, O., Meçe, M., & Ribaj, A. 2022).

Artificial intelligence (AI) is indeed another technology that is revolutionizing the banking sector. AI is increasingly being used by banks to automate and optimize their operations, improve the customer experience, and reduce costs. One of the most significant applications of AI in banking is the use of chatbots. AI-powered chatbots can simulate human conversation and provide personalized assistance to customers 24/7, reducing the need for human intervention. Chatbots can handle a wide range of queries, including account inquiries, transaction details, and even provide financial advice to customers (Ashta, A., & Herrmann, H. 2021).

AI also enables banks to analyze vast amounts of customer data and gain insights into their behaviors and preferences. This data can be used to personalize banking services based on individual preferences, thereby enhancing the overall customer experience. For instance, banks can use AI to recommend financial products and services to customers based on their spending patterns and investment goals.

Moreover, AI-powered fraud detection systems can identify fraudulent activities in real-time, preventing financial losses and ensuring the security of customer data. AI can also be used to analyze creditworthiness and assess risks associated with loan applications, enabling banks to make informed decisions and reduce the risk of defaults.

Overall, AI is transforming the banking industry by automating routine tasks, improving the customer experience, and reducing costs. As the technology evolves, we can expect to see more innovative applications of AI in the banking sector. Moreover, *cloud computing* enables banks to provide real-time access to data, allowing them to respond quickly to customer needs and market trends. This technology also offers greater flexibility and agility, allowing banks to quickly scale up or down their operations as needed. (Liu, S., Chan, F. T., Yang, J., & Niu, B. 2018).

In addition to the benefits mentioned above, the use of cloud computing in banking also helps improve cybersecurity. Cloud service providers have invested heavily in security measures and are better equipped to protect sensitive data than individual banks. By adopting cloud technology, banks can benefit from the advanced security measures implemented by cloud providers and free up resources that would otherwise have been used to maintain their own IT infrastructure.

However, banks need to ensure they comply with the regulatory requirements related to data privacy and security when migrating their operations to the cloud. They must also ensure they have appropriate security measures in place

to protect their data and infrastructure from cyber-attacks. Despite these challenges, cloud computing is a game-changer for banks that seek to remain competitive and innovative in a rapidly evolving digital landscape.

Blockchain technology is another exciting innovation that is transforming banking. Blockchain enables banks to conduct secure, tamper-proof transactions without the need for intermediaries. It also reduces the risk of fraud and provides customers with greater transparency and security in their transactions.

However, the rapid pace of technological change means that banks need to frequently switch systems and applications to keep up with the latest developments. This can be a costly process,

but banks recognize the importance of staying ahead of the curve and investing in the latest technologies to remain competitive (Laroiya, C., Saxena, D., & Komalavalli, C. 2020).

In addition to the challenges related to adopting new technologies, banks also need to address potential cybersecurity risks associated with digital transformation. As more customer data is collected and processed, the risk of cyber-attacks increases. Banks need to have robust cybersecurity measures in place to protect their customers' data and prevent data breaches. This requires continuous monitoring and updating of security protocols to keep up with emerging threats.

Moreover, banks need to ensure they have the right talent and skill sets to manage the complexities of digital transformation. They must recruit and retain employees who have the necessary expertise in data analytics, cybersecurity, and emerging technologies. Investing in talent development programs can help banks build the necessary skills to manage digital transformation effectively (Ilollari, O., Papajorgji, P., Civici, A., & Moskowitz, H. 2022).

Overall, the benefits of digital transformation in banking are significant, but banks must address the challenges associated with it. By investing in the latest technologies, talent development, and robust cybersecurity measures, banks can successfully navigate the digital landscape and provide better services to their customers.

2.1 The Emergence of Digital Transformation in the Banking Industry

Furthermore, digital transformation has also enabled banks to optimize their internal processes and improve efficiency. For example, many banks have implemented automated systems for routine tasks such as customer

onboarding, loan processing, and fraud detection. These systems not only improve accuracy and speed, but also free up resources for more complex tasks that require human intervention.

Moreover, the use of digital technologies has also opened up new revenue streams for banks. For instance, banks can offer value-added services such as financial planning, investment advice, and insurance products to their customers, which not only generate additional revenue but also deepen the relationship between the bank and the customer.

However, the adoption of digital technologies also comes with significant challenges, particularly in the area of cybersecurity. As banks become more reliant on digital systems and data, they also become more vulnerable to cyber-attacks. Banks need to invest heavily in cybersecurity measures to protect against data breaches, hacking attempts, and other cyber threats. This requires not only the implementation of robust security protocols and technologies, but also ongoing training and education for employees to ensure they understand and follow best practices for cybersecurity (Manoj, K. S. 2021).

The rise of digital transformation in the banking sector has created both opportunities and challenges for banks. While digital technologies offer numerous benefits, such as improved efficiency, new revenue streams, and a more personalized customer experience, they also require significant investment and ongoing efforts to manage risks and ensure compliance. Nevertheless, digital transformation is essential for banks to remain competitive and relevant in today's rapidly evolving business landscape.

For instance, banks are increasingly using artificial intelligence and machine learning to personalize the banking experience for their customers, by providing personalized financial advice and recommendations based on their spending patterns. In addition, the rise of digital banking has enabled banks to reach out to a wider range of customers, including the unbanked and underbanked populations (Bradford, T. 2020).

This is because digital banking offers a convenient and cost-effective way for customers to access banking services from anywhere, at any time. However, the rapid pace of technological change also presents challenges for banks. Banks need to invest in upgrading their infrastructure and upskilling their workforce to keep up with the latest trends and technologies. Moreover, they need to ensure that their digital offerings are secure and compliant with regulatory requirements.

Mobile banking has revolutionized the way customers interact with their banks, allowing them to perform transactions, access account information, and make payments through their mobile devices. Banks can now offer their customers the convenience of accessing banking services anytime, anywhere,

and with just a few taps on their smartphones. This has led to an increase in customer engagement and loyalty, as well as the ability for banks to offer tailored services and products (Gjino, G., & Ilollari, O. 2014).

Artificial intelligence (AI) has also played a crucial role in the digital transformation of the banking sector. AI-powered chatbots and virtual assistants have become popular tools for banks to provide personalized customer service, answer queries, and provide financial advice to customers. AI can also be used for fraud detection, risk management, and underwriting. By using machine learning algorithms, banks can analyze vast amounts of data to identify patterns and trends, which can help them make informed decisions and predict customer behavior (Ilollari, O., Papajorgji, P., Gere, A., Zemel, R., & Moscowitz, H. R. 2019).

Cloud computing has provided banks with the ability to store and process large amounts of data, without the need for physical servers. This has enabled banks to reduce their infrastructure costs, increase their scalability and flexibility, and improve their security and disaster recovery capabilities (Li, F., Lu, H., Hou, M., Cui, K., & Darbandi, M. 2021).

Blockchain technology has the potential to revolutionize the way banks operate, particularly in the area of payments and settlements. By using blockchain, banks can reduce transaction times and costs, increase transparency and security, and eliminate the need for intermediaries. Blockchain can also be used for identity verification and secure data sharing between banks and other financial institutions.

Overall, the adoption of digital technologies has allowed banks to become more agile, efficient, and customer-centric. However, it is essential for banks to continue to innovate and adapt to the changing technological landscape to remain competitive in the future (Vives, X. 2019).

One-way banks can manage their resources more intelligently is through automation. Automation can help banks streamline their processes, reduce errors, and increase efficiency, ultimately saving time and money. For example, banks can automate routine tasks such as data entry or customer onboarding, freeing up employees to focus on more complex tasks that require human input. In addition, automation can help banks comply with regulatory requirements and reduce the risk of human error. By investing in automation, banks can not only increase their operational efficiency but also improve their customer experience by providing faster and more accurate service.

Another key aspect of managing resources more intelligently is talent development. Banks need to invest in training and upskilling their employees to ensure that they have the necessary skills and knowledge to succeed in a digital world. This includes not only technical skills but also soft skills such as

communication, problem-solving, and adaptability. Banks that invest in their employees can create a culture of innovation and continuous improvement, which is essential for staying competitive in the rapidly evolving digital landscape.

Finally, banks need to develop partnerships and collaborations to maximize the benefits of digital transformation. Collaboration with fintech startups, for example, can help banks leverage new technologies and business models without having to build everything in-house. These partnerships can also help banks access new customer segments and expand their reach. By embracing collaboration and partnership, banks can create a more innovative and agile business model that is better equipped to meet the demands of a rapidly changing market (Senyo, P. K., & Karanasios, S. 2020)

Real-time strategic planning allows banks to be agile and responsive to the changing market conditions and customer needs. It involves using data and analytics to identify opportunities and potential risks in real-time, and then developing strategies to capitalize on those opportunities or mitigate those risks. This approach requires a flexible and dynamic organizational structure that can quickly adjust to new information and changing circumstances.

In addition to agile methodologies and real-time strategic planning, banks must also prioritize cybersecurity and regulatory compliance in their digital transformation efforts. As digital technologies become increasingly integrated into banking operations, the risk of cyber-attacks and data breaches also increases. Banks need to invest in robust cybersecurity measures to protect customer data and financial transactions from potential threats (Aldasoro, I., Gambacorta, L., Giudici, P., & Leach, T. 2022).

Furthermore, regulatory compliance is a critical consideration in the adoption of digital technologies in the banking industry. Banks need to comply with a wide range of regulations and standards that govern the collection, use, and storage of customer data, as well as financial transactions. Failure to comply with these regulations can result in significant financial penalties and reputational damage. Therefore, banks need to ensure that their digital offerings meet regulatory requirements and that their staff is trained to comply with these standards (Armour, J., Mayer, C., & Polo, A. 2017).

In conclusion, digital transformation has revolutionized the banking industry and has become essential for banks to remain competitive. However, to realize the full benefits of digital transformation, banks need to invest in a holistic approach that includes data and analytics, resource management, talent development, cybersecurity, regulatory compliance, and real-time strategic planning. By doing so, banks can enhance the customer experience, streamline

their operations, and generate new business models that meet the changing needs of customers and the market (Ilollari, O., Meçe, M., et al, 2022).

3. Digital Banking in Albania

Mobile banking is relatively a new service offered by a few banks in Albania. Banks are obliged to keep investing in new technologies as otherwise they would lose market share. It is although interesting to know how clients react to these innovation efforts.

In Albania, the adoption of digital banking has been gaining momentum in recent years. The country's banking sector has been undergoing significant transformation, with the adoption of new technologies and innovative solutions. Digital transformation has become a key priority for Albanian banks as they strive to meet the evolving needs of their customers and remain competitive in the market (Ilollari, O., Papajorgji, P., et al, 2020).

Digital banking has revolutionized the banking industry in Albania in recent years, as it has across the globe. With the increasing adoption of technology and analytics, banks in Albania are no longer left with a choice but to embrace digital banking in most of their operations.

One of the main advantages of digital banking is the ability to improve the customer experience. Customers can now access their bank accounts, make transactions, and get support anytime, anywhere through mobile banking applications. This convenience has resulted in increased customer satisfaction and loyalty, and banks in Albania are investing in their mobile banking platforms to provide more value-added services.

The use of mobile devices in Albania's banking sector has also enabled banks to reach more customers, including those in rural or remote areas where traditional banking services may not be readily available. This has helped to increase financial inclusion and provide greater access to banking services for all Albanians.

Furthermore, the adoption of mobile banking has also led to an increase in financial literacy among Albanians.

Mobile banking apps provide customers with easy access to their account information and transaction history, helping them to better manage their finances. Banks have also been offering educational resources and tools through their mobile apps, such as budgeting calculators and financial planning advice, which have helped customers to make better financial decisions (Ilollari, O., Papajorgji, P., Civici, A., & Moskowitz, H. 2022).

Overall, the increasing use of mobile devices in Albania's banking sector has been a significant driver of digital transformation, providing customers with

greater convenience, accessibility, and financial literacy. Banks will continue to invest in mobile banking technologies to stay ahead of the curve and offer the best possible banking experience for their customers.

The use of artificial intelligence and predictive analytics has also been on the rise in Albania's banking sector. Banks are leveraging these technologies to analyze customer data, detect fraud, and improve risk management. This has enabled banks to offer personalized services and tailor their offerings to meet the specific needs of their customers.

In addition to these advancements, Albania's banking sector has also embraced cloud computing and blockchain technology to improve data storage and security.

The use of cloud computing has enabled banks to store and access large amounts of data more easily and securely, while blockchain technology has facilitated secure and transparent transactions (Mhlanga, D. 2020).

Despite the progress made, there are still challenges associated with digital transformation in Albania's banking sector. Cybersecurity remains a major concern, and banks must invest in robust security measures to protect customer data and prevent fraud. Additionally, there is a need for a highly skilled workforce that can keep up with the fast-paced digital environment.

The adoption of digital banking has also led to the emergence of new business models in the banking industry in Albania. Fintech companies are partnering with traditional banks to provide innovative solutions, such as peer-to-peer lending, robo-advisory services, and digital wallets. Banks are also launching their own fintech solutions to compete with these new entrants. To address this challenge, banks need to adopt a strategic approach to digital transformation that focuses on maximizing the value of their technology investments.

This includes adopting agile methodologies to enable faster response times to market changes and customer needs, investing in talent development to ensure that their workforce has the skills and knowledge required to support digital transformation initiatives, and partnering with FinTechs and other technology providers to leverage their expertise and capabilities.

In addition, banks can explore innovative business models, such as open banking, which involves sharing data and services with third-party providers to create new revenue streams and enhance customer experience. By adopting a comprehensive approach to digital transformation, banks in Albania can remain competitive and profitable in the rapidly evolving digital landscape (Liu, M. X. (2021).

4. Conclusion

The adoption of digital transformation has become a necessity for banks that aim to remain competitive and relevant in the market. The banking sector has witnessed significant changes as a result of digital banking, which has enabled banks to offer innovative services, enhance operations, reduce costs, and generate new revenue streams. The use of advanced technologies, such as mobile banking, artificial intelligence, cloud computing, and blockchain, has revolutionized the way banks operate, interact with customers, and create business models. Although digital transformation has presented challenges, the benefits of personalized experiences and greater accessibility make it a necessary and inevitable evolution in the banking industry.

Digital transformation is an ongoing trend in the banking sector that is expected to continue in the years to come. Banks must invest in a holistic approach to digital transformation, including data and analytics, smarter resource management and talent development, new ways of working, and real-time strategic planning to succeed in this rapidly evolving landscape (Scardovi, C. (2017).

In Albania's banking sector, digital transformation has brought about significant changes, providing customers with more convenient and personalized banking experiences. However, banks must address challenges related to cybersecurity and talent development to ensure a successful transition to the digital age.

Despite the challenges, the rise of digital banking in Albania presents many opportunities for banks to provide better services, increase efficiency, and drive innovation. To remain competitive in the market, banks need to continue investing in data and analytics, talent development, and real-time strategic planning as digital transformation continues to shape the banking industry.

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Data Security and Privacy Challenges

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Abstract
In recent years, the digitization of almost every life activity has begun, thus a question arises: Are we ready for such massive use of technology? Any increase in their use also raises the question of how secure the data we use and transmit are, and also when using data and information, whether we are infringing the privacy of given entities. Therefore, the purpose of this paper is to show that data security and their privacy are not the same thing and thereafter what can be the damages from this enormous increase of the use of information quantities, as well as what are the challenges of the privacy. We will also present through graphs the growth over the years in the use of information technology devices in the world. The methodology used in this paper is the comparison of data obtained from specialized cyber security and statistical magazines, the newest scientific papers in this field as well as official data from government institutions. The data collected will be analyzed and the trend for the coming years will be forecasted, both from the aspect of the increase in the use of technology as well as from the aspect of security.
Keywords*: technology, security, privacy, data, cyber attack*

1.Introduction

Information technology has undergone an unimaginable development during the last decades. This development has transformed the way we live, work, and interact with one another and the world around us. The use of mobile devices, the necessary connection to the internet, and the development and proliferation of various applications have led to a significant increase in the use of information technology.

Although this development has brought tremendous advances in many aspects of our lives, it has also brought great challenges in regard of data security and individual privacy. The benefits of technology utilization often come with risks and potential infringements of personal data. In this context, challenges related to data security and privacy have gained particular importance. One of the main challenges is the upsurge in cyberattacks or, as commonly said, hacker attacks. Nowadays, with our data stored electronically,

those interested in finding sensitive information have a wide array of space to attack. These attacks may lead to loss of personal data, identity breaches, and misuse of financial data primarily.
Another challenge concerns the collection and processing of personal data by technology companies. The use of social applications and platforms is often associated with the user's consent to share their personal information. This information can be used to build profiles with more data on users and to exploit their preferences for the purpose of personalized advertising.
Also, the growth of Internet-of-Things (IoT) devices has opened the possibility for monitoring and collecting data in other spheres of life, thus raising questions about the infringement of privacy and data security related to their use.
These challenges of increased use of information technology have fueled extensive discussions on the role of law and policies on data security and privacy. The demand for better regulation and protection of personal data has increased, as companies and individuals are challenged to find sustainable ways in order to secure data and maintain privacy. In this context, it is important to review the manners in which the society can face the current and future challenges of data security and privacy. Discussions and interventions to enhance user awareness, build proper security standards, and develop appropriate laws are important steps toward a more sustainable and secure use of information technology.

3. Data security

The main goal of data security is to guarantee the integrity, confidentiality and availability of data. Integrity helps to ensure the accuracy and completeness of data, preventing unauthorized changes. Confidentiality ensures that only authorized persons have access to data, using encryption techniques and access control. Availability enables data to be available when a legitimate demand for it occurs, minimizing service downtime.

3.1. Percentage of compromised organizations and cyber attacks

The figure below shows the percentage of organizations compromised by at least one (and more than six) successful attacks, by year[1].
Figure 1: Organizations attacked by years

Under figure 1, we see that the percentage of attacks against organizations from 2014 to 2022 has increased by 23.4%, which is a direct consequence of the

[1] https://cyber-edge.com/cyberthreat-defense-report-2022/, date of access: 15 April 2023

enormous increase in the use of information technology devices, especially mobile devices (which will be seen in the figures below).
Under figure 2 we see that 14.7% of organizations didn't suffer any cyberattacks in 2022, 12.8% of them suffered more than 10 times, 27.9% of them between 6 to 10 times and between 1 to 5 times 44.6% of organizations have suffered cyberattacks[2].

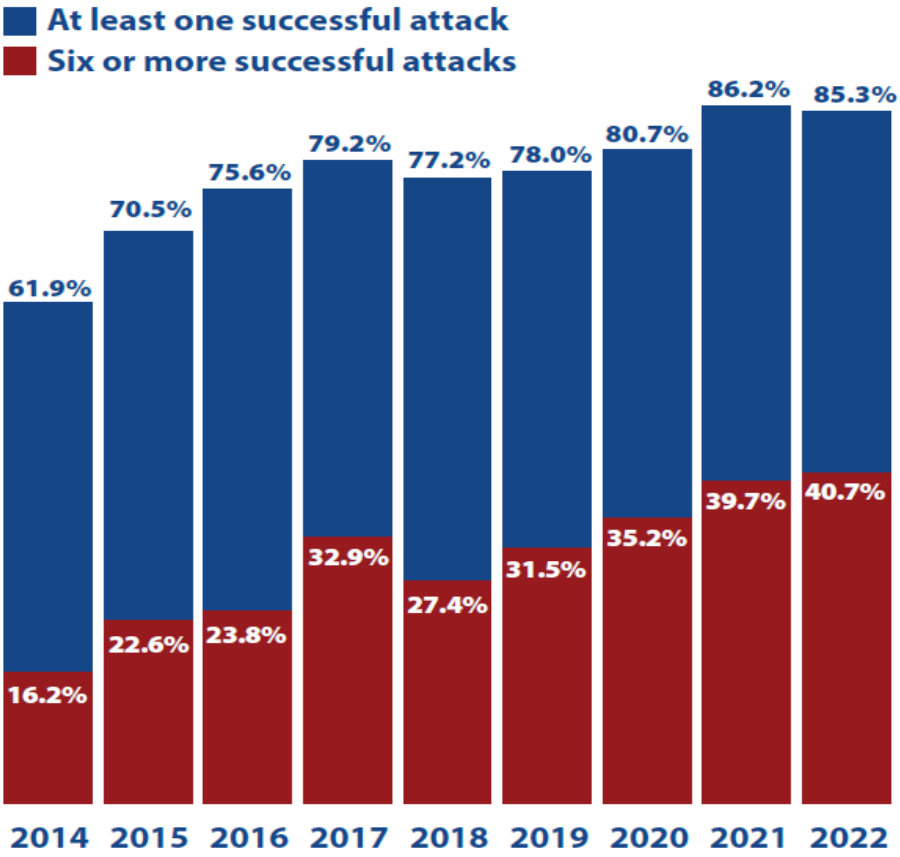


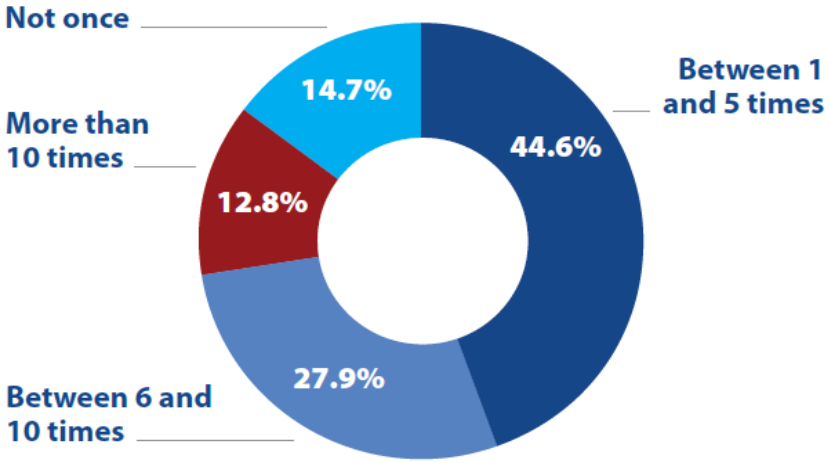
Figure 2: Percentage of cyberattacks in 2022

3.2. Damages from cybercrime

According to specialized organizations, cybercrime is the third economy in the world after the economy of the United States of America and China[3].

[2] https://cyber-edge.com/cyberthreat-defense-report-2022/, date of access: 16 April 2023
[3] Morgan, S https://shorturl.at/ioJOS date of access: 18 April 2023

According to Forbes, cybercrime is expected to cost the world 8 trillion dollars in 2023[4].
During 2021, the damages were as follows: 16.4 billion dollars per day, 684.9 million dollars per hour, 11 million dollars per minute and 190 thousand dollars per second[5]. Thus, for the year 2023 the expectations are as follows: 21.9 billion dollars per day, 913.2 million dollars per hour, 15.2 million dollars per minute and 253 thousand dollars per second[6].



3.3. Quantity of information in circulation

With the increase in the number of devices in circulation and their massive use, the quantity of information that circulates is extremely huge. This information in circulation is very valuable to malicious individuals, various corporations as well as intelligence services. Some of the predictions for the number of images shared during 2023 on social networks and other platforms are as follows[7]:

- on WhatsApp: 6.9 billion images per day
- 1.3 billion images will be shared on Instagram (daily)
- 100 million Instagram posts (daily)
- 1 billion in stories and chats on Instagram (daily)
- 750 billion images will be on the Internet (6% of all photos)

[4] Yuen P. https://shorturl.at/cqAOR date of access: 15 May 2023
[5] https://cybersecurityventures.com/cybercrime-damages-6-trillion-by-2021/, date of access: 15 May 2023
[6] https://cyber-edge.com/cyberthreat-defense-report-2022/, date of access: 15 May 2023
[7] Broz, M https://photutorial.com/photos-statistics/ date of access: 22 May 2023

- 92.5% of photos will be taken with smartphones (7.5% with cameras)
- 136 billion images on Google Images
- in 2030, there will be 382 billion images on Google Images

While the number of emails sent and received per day in the world from 2017 to 2025 (in billions) is shown in figure 3[8].

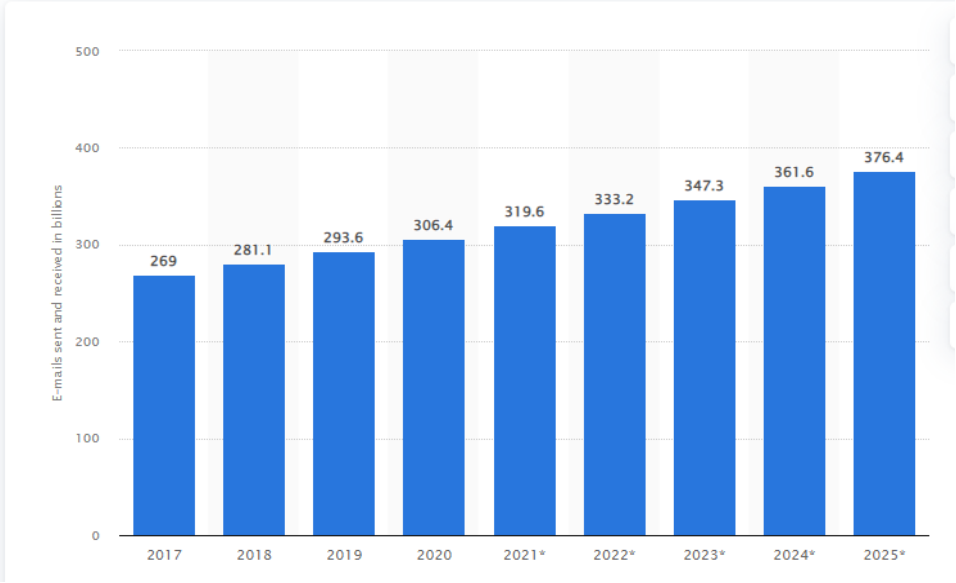


Figure 3: number of emails sent and further predictions

Therefore, from figure 3 we can see that the number of emails per day sent during 2017 was 269 billion, while the predictions for 2025 are 376.4 billion emails sent and received per day.

The number of daily tweets on Twitter in 2022 was as follows:[9]:

- 350,000 tweets sent per minute
- 500 million tweets sent every day
- 200 billion tweets per year

4. Data privacy and its challenges

Data privacy, as opposed to data security, consists of the policies and processes that dictate how an institution collects, shares, and uses data. So, Data Privacy is about the state laws that apply to institutions or businesses in a given

[8] Ceci, L https://www.statista.com/statistics/456500/daily-number-of-e-mails-worldwide/ date of access: 30 May 2023

[9] Sayce, D https://www.dsayce.com/social-media/tweets-day/ date of access: 1 June 2023

country or industry. While the National Institute of Standards and Technology (NIST) (USA) defines privacy as "The guarantee that confidentiality and access to information with regard to certain entities are protected". The top five data privacy challenges so far are[10]:

- Exponential data growth
- The cost of maintaining data privacy
- Number of detected vulnerabilities
- Advanced IoT and Mobile technologies
- Human error

Due to the infringement of these rules and due to the non-compliance of their actions with the General Data Protection Regulation (GDPR[11]), the Irish Data Protection Commission in January of this year (2023), fined the social network Meta Facebook and Instagram with 390 million euros[12].

4.1. What to be expected in 2023

During the current year, the following measures have been undertaken:

- Increased security with regard to "ransomware"[13] viruses and other cyberattacks
- Additional restrictions in the data transfer between countries
- Enhanced focus in the field of AdTech (advertising technology)[14]

5. The extent of digitalization of equipment in Kosovo

Under figure 4 we can see the changes over the years in the increase in the digitalization of manufacturing equipment by Kosovar companies.

Figure 4: comparison of the extent of digitalization of manufacturing equipment

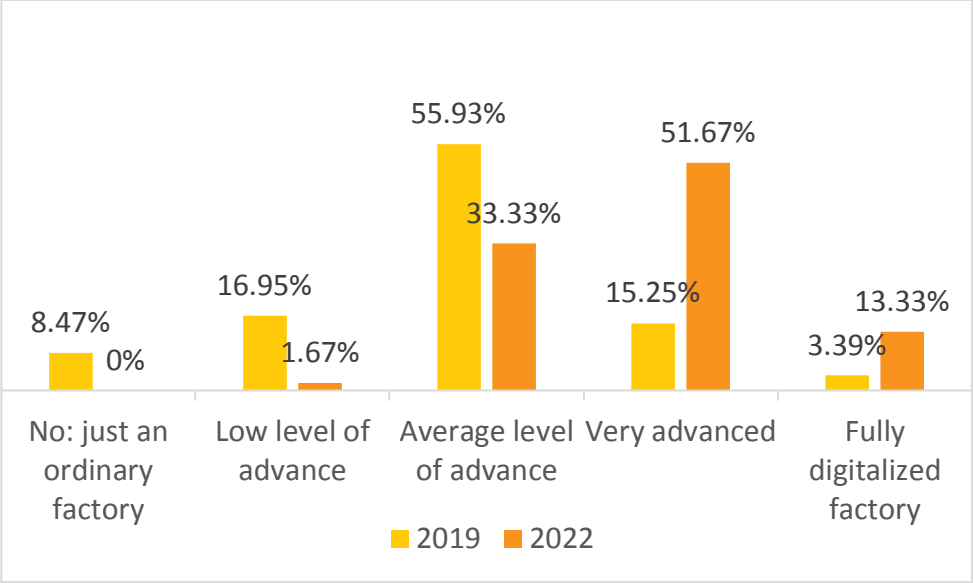
[10] Ponemon Institute, https://www.ponemon.org/local/upload/file/The_Human_Factor_in_data_Protection_WP_FINAL.pdf date of access: 3 June 2023

[11] Official website, https://gdpr-info.eu/art-4-gdpr/ date of acces: 5 June 2023

[12] Murray, S https://www.irishexaminer.com/news/arid-41041013.html date of access: 5 June 2023

[13] https://www.trendmicro.com/vinfo/us/security/definition/ransomware date of access: 5 June 2023

[14] https://www.oracle.com/uk/cx/advertising/adtech/ date of access: 6 June 2023



From the figure above, we see that in 2022, 33.33% of manufacturing enterprises had an average advanced level of digitalization of manufacturing equipment, 51.67% a very advanced level of digitalization of manufacturing equipment, while 13.33% were fully digitalized factories[15].

6. Number of connected IoT devices

Under figure 5 it is shown the number of connected IoT devices between 2019 and 2021 and predictions from 2022 up to 2030[16].

[15] https://www.oek-kcc.org/uploads/files/2020/June/30/Studimi_baze_Sfidat_dhe_mundesite1593526300.pdf date of access: 6 June 2023

[16] https://www.statista.com/statistics/1183457/iot-connected-devices-worldwide/ date of access: 8 June 2023

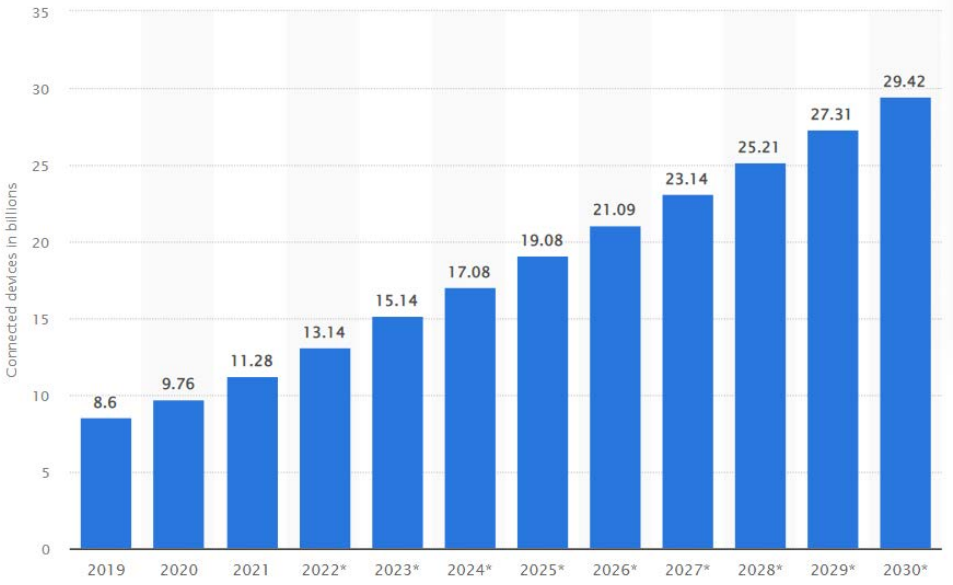


Figure 5: Number of connected IoT devices in the world

Under figure 5 it can be noted that the number of functional IoT (Internet of Things[17]) devices in the world in 2019 was 8.6 billion, while the prediction for 2023 is 15.14 billion of such devices. So, in a time difference of 4 years, we have almost doubled the use of devices that are connected to the Internet. This extremely large number of their use (the projection for the year 2030 is 29.42 billion) also increases the attention of various hackers, who either for curious or malicious reasons try to get data from such devices. These data, after they are processed, turn into important information for a lot of people.

7. Conclusion

Taking note on the very high number of technological devices in use when we are connected to the Internet, including IoT devices, we can say that the chances of being safe are very small while using those devices. As we saw from the graphs above, the tendency of increase in their use is growing exponentially, and therefore the challenges are much greater. Having to know that the largest number of damages is caused by fraud, then the best defense is technological education. If we are not mistaken and are influenced by fraud, then the data will be lost and we will be blackmailed to return it. In addition

[17] Posey, B https://www.techtarget.com/iotagenda/definition/IoT-device date of access: 10 June 2023

to technological education, there are other ways of protection, such as double authentication, however, the best way is not to click on those links and emails that we do not know and are not sure of their authenticity.

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3. https://shorturl.at/cqAOR
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7. https://www.dsayce.com/social-media/tweets-day/
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14. https://www.statista.com/statistics/1183457/iot-connected-devices-worldwide/
15. https://www.techtarget.com/iotagenda/definition/IoT-device

The real problem of humanity is the following: We have Paleolithic emotions, medieval institutions and Godlike technology - Edward O. Wilson

Social Capital and Digitalisation: A Necessary Interplay for Achieving Circular Economy: What Possibilities and Challenges for Albania?

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Abstract
Collective greening agendas that foster the transition to circular economy models need to be understood in a digitalised context. This study examines the pathways to the circular economy in a digital context in Albania. The input-output model used in this paper suggests the importance of social capital in digital development and the latter in the circular economy. The use of secondary data from well-known official indices such as the Knowledge Economy Index and the Network Readiness Index shows that low social capital, especially e-social capital, could hinder the process of digital development. Low digital development also hinders the creation of social capital in virtual and non-virtual platforms, which slows down the development of the circular economy. Further studies with primary data are needed to empirically test the input-output model. However, stakeholders can use the proposed input-output model to simulate Circular Economy development by leveraging social capital and digital development. Additional studies are needed to empirically validate the model with possible interactions between structural and social capital as input in the relationship between digital development and circular economy.

Key words: Digitalization development, social capital, circular economy, network readiness index, knowledge economy index

Introduction

The European Union (EU) Green Deal is one of the six priorities of the European Commission's Political Guide for 2019–2024. This Agreement presents a series of measures aimed at creating a sustainable economy in the EU through the efficient use of resources, reducing pollution and CO_2 emissions, protecting biodiversity, and combating climate change. All this

means embracing a new economic model – the circular economy model (CE). The first efforts to move to a circular economy started in 2015 with the approval of the Action Plan (European Commission 2015). This plan aims to move from the linear to the circular model. This plan aims to move forward from the linear model to the circular model. This plan, which promotes innovation, competitiveness, and job creation, is in line with several EU priorities in the environmental, social, and industrial fields, as well as in line with the principles of creating a sustainable economy without carbon (carbon-free) and efficient in the use of energy. In 2016, employment in sectors related to the circular economy increased by 6% compared to 2012 (European Commission 2019).

Achieving climate neutrality by 2050 will be more challenging for some Member States and regions than others because some of them are more dependent on fossil fuels or have carbon-intensive industries (European Commission 2019). Albania and other Western Balkans (WB) are at different steps in aligning and implementing their legislations with the EU "Acquis". Similarly, the adoption, implementation and enforcement of the Acquis on the environment is an obligation for accessing countries in the framework of the *Stabilisation and Association Process*. In a digital development context, successful implementation of the EU Green Deal is also linked with the ability of these countries to embrace the rent coming from the technological revolution and digitalization (Agnusdei et al., 2023; Tseng et al., 2018). Similarly, the transition to a CE requires public and private sector investments and also an important stock of social capital (SC) (Penz et al., 2018). Social capital consists of trust, norms, and networks which among them constitute a single unit of capital that can be utilized in achieving common goals (Putnam, 2000, 2022). SC plays a significant role in the transition to CE because it facilitates information sharing, collaboration, and collective action among diverse stakeholders, including businesses, governments, and civil society organizations (Istiyani & Wijayanto, 2022; Marjamaa et al., 2021).

Also, the presence of strong social networks, regulations and trust enables knowledge exchange, resource mobilization, and the formation of partnerships necessary for CE initiatives to flourish (Cantele et al., 2020). On the other hand, businesses must adopt innovative business practices based on new and efficient technologies. According to Naqvi et al., (2020) and Sundu et al., (2022) the e-economy developments in the virtual environment with the Internet of Things (IoT), smart cities, big data, and artificial intelligence (AI) technology have transformed digitization into a disruptive force with far-reaching effects on the economy and well-being. Consequently, the mutual reinforcement between digitalization development (DD) and SC can be crucial

in achieving a more sustainable and circular future (Alghababsheh & Gallear, 2021; Curtis et al., 2020; Liu et al., 2023).
This paper's objective is twofold. Firstly it examines the dyadic (reciprocal) relationship between digitalisation development and SC and how their mutual interactions sustain CE objectives. It also suggests an input-output conceptual framework linking the three concepts. Secondly, it examines the possibilities and challenges of Albania while exploring the relationship between SC-DD and CE. The remainder of this paper is structured as follows. The first section presents a literature review of the interplay between 1) social capital (SC) and circular economy (CE), 2) digitalisation development and CE, and 3) SC-DD interplay and CE. Digitalisation development and CE, and 3) SC-DD interplay and CE. The second section describes the methodology of the paper. The third section introduces Albania as a case study to illustrate its potential pathway to CE in a digitalised context. Finally, discussions and conclusions.

1. Literature review and conceptual framework development

The CE promotes resource efficiency, waste reduction, and closed-loop systems (Vu, 2023), while digitalization offers opportunities for data-driven decision-making, automation, and enhanced connectivity (Naqvi et al., 2020; Sundu et al., 2022). On the other hand, SC, characterized by trust, collaboration, and shared values, facilitates cooperation, knowledge sharing, and inclusive participation. The role of SC in driving behavioural change towards CE in a digitalized context will be developed in the following section.

1.1 Social Capital and Circular Economy

CE and sustainability are increasingly gaining the attention of academia, industry, and policymakers, and often their dissimilarities are only sometimes apparent. In a review by (Geissdoerfer et al., 2017) , the Circular Economy is defined as a regenerative system in which resource input, waste, emission, and energy leakage are minimised by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling. Thus the CE is a specific approach within the broader concept of sustainability. While the CE focuses on optimizing resource use and material cycles within the economy, sustainability takes a more comprehensive and long-term perspective, considering the social, economic, and environmental dimensions of well-being (Bocken et al., 2014; Geissdoerfer et al., 2017; Ghisellini et al., 2016).
Studies show that by leveraging SC, communities and organizations can accelerate the transition to a more sustainable and CE model (Geissdoerfer et al., 2017; Penz et al., 2018) (Jameaba, 2022). Following (Putnam, 2000, 2022)

substantial stock of SC with networks of civic engagement fosters norms of generalised trust and reciprocity, facilitating coordination and communication. Social capital through solid social networks enables the exchange of knowledge, resources, and ideas, enabling the transition to a CE (Jameaba, 2022; Pusz et al., 2023). Another dimension associating SC with CE is through Sharing Economy and trust. SC, particularly trust, is fundamental in establishing the necessary relationships and networks for successful sharing economies. Trust makes individuals comfortable lending or borrowing goods and services, fostering resource efficiency and reducing waste (Tsou et al., 2019). Similarly, Wu & Shen (2018) shows that to foster trust in the sharing economy, practitioners should simultaneously enhance institutional trust, product trust and interpersonal trust. Also, community building on the consumer side is encouraged through processes of trust building and implementation of regulations (Penz et al., 2018). Through social networks, shared norms, and peer influence, SC can support the adoption of sustainable behaviors and practices associated with the CE. On an individual level, responsibility toward environmental protection usually serve as a signal that contributes to increased consumption of green products and facilitates CE pathways (Gura et al., 2021). Trusting people are more inclined to contribute to environmental public goods by recycling, conserving water, using public rather than private transport and buying green products (Fairbrother, 2016; Irwin & Berigan, 2013). Similarly, when social trust is high, individuals perceive that most individuals within a community will abide by the regulations and cooperate to achieve a common goal more trusting people tend to contribute more to environmental public goods by recycling, conserving water, using public rather than private transport, and buying green products (Irwin and Berigan 2013). When social trust is high, individuals perceive that most community members will abide by the regulations and cooperate to achieve a common goal (Pangil & Moi Chan, 2014). In addition, through SC, precisely social networks, individuals and organisations can share ideas, co-create solutions, and drive innovation, promoting circular practices within the community or industry (Avelino et al., 2019). SC also, contributes to community engagement by fostering participatory processes, inclusive dialogue, and collective decision-making. Strong social connections and networks allow for a broader range of perspectives to be considered, ensuring that CE initiatives reflect the needs and values of the community. Fratini et al., (2019) can encourage transformative pathways for socially inclusive and environmentally beneficial value in cities. Finally, SC facilitates the alignment of policies with community needs, promoting supportive regulations and incentives for CE practices (Galvão et al., 2020; Kurniawan et al., 2021; Lieder

& Rashid, 2016; Mhatre et al., 2021). Nevertheless, SC and its leveraging in supporting CE is inevitably linked to the possibilities and challenges of each community and country in developing a digitalized ecosystem.

1.2 Digitalisation and circular economy

Undeniably, the digital economy is a concept that needs to be fully defined (as it has unclear boundaries), being highly dynamic and with consequences far beyond the same e-economy (Moroz, 2017). Therefore, the first step is determining its meaning and the inventory of existing DD prospects. The factors that make up the digital economy are usually thought to include telecommunications infrastructure and networks; and the use of information and communication technology (ICT) by individuals, businesses and government institutions. Data analytics, the Internet of Things (IoT), Digital Platforms and Sharing Economy, Blockchain Technology, Digital Manufacturing Technologies, Circular Design and Product Lifecycle Management (PLM) are some pathways to support the transition to the CE. As mentioned earlier, Digitalisation and CE are two interlinked concepts with significant potential in addressing sustainability challenges and as drivers of economic growth. Digital technologies enable the collection, analysis and sharing of vast quantities of data (data and analytics). This data can provide valuable insights into resource flows, product life cycles, helping identify opportunities for improved resource management and waste reduction (Antikainen et al., 2018). By harnessing data analytics, businesses and policymakers can make informed decisions and optimize their operations to support CE principles (Gupta et al., 2019; Kurniawan et al., 2021). Similarly, digitalisation can drive the transformation towards CE by providing accurate information on product availability, location and condition (Antikainen et al., 2018). In a CE context, the Internet of Things (IoT) devices can monitor and track the usage, maintenance, and end-of-life stages of products (Pagoropoulos et al., 2017) (Bressanelli et al., 2018). This information can enable better product design, facilitate asset sharing and monitoring, streamline maintenance processes, and support the deployment of new business models such as product-as-a-service (Bocken et al., 2014, 2016). Similarly, new forms of sharing, the 'sharing economy', have emerged with the spread of digital technologies (Pouri & Hilty, 2021). Digital platforms play a crucial role in enabling peer-to-peer sharing and collaborative consumption models (Belk, 2007). They connect individuals or businesses who have underutilized assets or resources with those who need them. These platforms foster reuse. Examples include ride-sharing platforms, co-working spaces, and online marketplaces for secondhand goods (Aurélien Acquier et al., 2019). In

the same area, Blockchain Technology (BC) has emerged as a critical enabler for accelerating the transition towards CE (Rejeb et al., 2023). Blockchain is a distributed ledger technology that allows transactions to be safely and transparently documented (Upadhyay et al., 2021). BC can contribute to CE by helping to reduce transaction costs, improving performance and communication along the supply chain, protecting human rights, strengthening the confidentiality and welfare of healthcare patients, rebuilding trust in supply chains and lowering carbon footprints (Upadhyay et al., 2021). Also, Dgital Manufacturing Technologies like 3D printing and additive manufacturing enable localized, on-demand production, reduce waste and transportation emissions associated with traditional manufacturing (Wang et al., 2021). Digital design tools, simulations, and virtual prototyping also facilitate more sustainable product development processes by optimizing material use and minimizing physical prototypes (Muth et al., 2023).

Through digital tools, circular Design and Product Lifecycle Management (PLM) support circular design principles by enabling product designers to consider aspects such as material selection, recyclability, reparability, and disassembly. Product-as-a-Service (PaaS) offerings have the potential and advantages to enable societies to shift to a circular economy and increase environmental performance (Sakao & Nordholm, 2021). PLM systems help manage product information throughout its lifecycle, ensuring better collaboration, tracking of constituents and supporting efficient material recovery at the end of life (LCA lifecycle management)(Reslan et al., 2022). However, It's important to note that while digitalisation offers significant opportunities, it also presents challenges such as data privacy concerns, e-waste management, and energy consumption. These issues must be addressed to fully harness the potential of digitalisation for the CE and ensure a sustainable and inclusive transition (Chauhan et al., 2022). Similarly, SC and collective actions are needed to capture the rent provided by the digitalization of the economy. Stakeholder-led mutual support and coordination, coupled with holistic information processing and sharing across the supply chain network, can provide an effective basis for achieving the triple bottom line of economic, environmental and social benefits(Gupta et al., 2019).

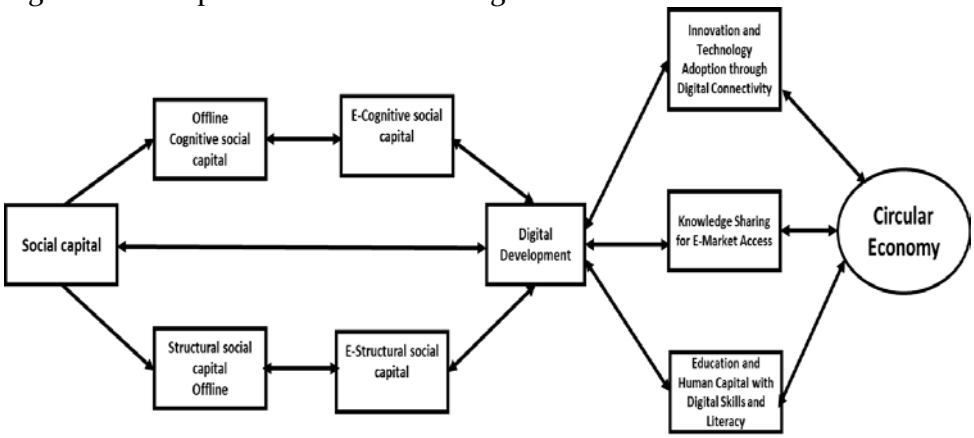
1.3 Social capital-digitalisation development (DD) and CE pathway

The dyadic relationship between SC and DD refers to the interplay and mutual influence between these two concepts. As previously mentioned, SC refers to the resources, networks, and relationships that individuals and groups possess within a social structure, enabling them to access and leverage collective

benefits (Kokthi et al., 2021; Pusz et al., 2023; Putnam, 2000). On the other hand, DD refers to the adoption and integration of digital technologies and the resulting transformation in various aspects of society, including communication, economic activities, and social interactions (Chauhan et al., 2022; Kurniawan et al., 2021; Pouri & Hilty, 2021). SC can play a crucial role in facilitating and supporting the digitalisation process (Lyu et al., 2022). The presence of strong social networks, trust, regulations and social norms can enhance the diffusion and adoption of digital technologies (Auliah et al., 2022; Hamari et al., 2016; Liu et al., 2023). For example, individuals or communities with strong social ties may share information, experiences, and knowledge about digital tools and technologies, encouraging others to adopt them. Trust within social networks can also reduce the perceived risks associated with digitalization, leading to greater acceptance and usage of digital technologies (Bencsik et al., 2022). Strong social ties and networks can facilitate collaboration, knowledge sharing, and cooperation among individuals and organizations, promoting innovation, entrepreneurship, and digital skills development (Martin-Rios et al., 2022). On the other hand, digitalization can influence SC formation, maintenance, and dynamics. Digital technologies, such as social media platforms, online communities, and digital communication tools, provide new avenues for social interactions, networking, and the creation of virtual communities (Hoang et al., 2023). These digital platforms can enable individuals to connect with others, establish new relationships, and maintain existing social ties, thereby expanding their SC (Hammad & El Naggar, 2023). DD can also enhance the efficiency and effectiveness of social capital utilization. Digital tools and platforms can facilitate information sharing, coordination, and collective action, leading to increased collaboration and problem-solving within social networks. For example, digital media can enable communities to organize and mobilize resources for social causes or engage in collective decision-making processes. Barbosa Neves et al., (2018) indicate that the Internet appears to help maintain, accumulate and even mobilise SC, but older adults were less likely to have high levels of SC; however, frequent Internet users had higher levels than other users and non-users. Cross-industry networks of multiple supply chains have evolved in the CE model using approaches such as industrial and urban symbiosis (Tseng et al., 2018). Despite the clear benefits of big data-driven industrial symbiosis, gaps remain in data-driven at operational level. Collaborative efforts among stakeholders can help maximize the positive impacts of digitalization, promote responsible and inclusive digital transformation, and ensure the fair distribution of benefits among all stakeholders. On the other hand, digitalization provides tools and platforms

that enhance the reach and effectiveness of SC in driving behavioral change. Also, digital platforms can facilitate the dissemination of information, amplify the visibility of CE initiatives, and provide avenues for online engagement, strengthening SC influence on behavioral change. ICTs have enabled the rise of 'collaborative consumption' (CC) - a form of consumption where people share goods and services online (Hamari et al., 2016). However, digitalisation may also have potential negative impacts on SC see (Trittin-Ulbrich et al., 2021) for a review. For instance, excessive reliance on digital interactions and online communities might reduce face-to-face interactions, weakening social ties and social cohesion. Furthermore, digital divides, such as unequal access to technology and digital skills, can exacerbate existing social inequalities, potentially limiting the development of SC and their inclusion in a digitalised society (Trittin-Ulbrich et al., 2021; Wilhoit & Kisselburgh, 2015). In summary, the dyadic relationship between SC and DD involves a reciprocal influence. SC can facilitate the adoption, diffusion, and success of digitalisation, while digitalisation can impact social capital's formation, utilization, and dynamics. In order to explore the relationship between SC-DD-CE, we propose a conceptual model showing the linkages and their operationalisation. We assumes that important SC stock will boost Albania's e-economy's digital development and consequently give place to CE development. To unfold this relationship, we employ an input-output logic. As shown in Figure 1, the input is SC, structured into two main types, cognitive and structural social capital, offline and online social capital (e-social capital). Following the review, a reciprocal relationship is suggested. The suggested conceptual framework also assumes DD as a mediator toward CE as an outcome through three pathways, as presented in Figure 1.

Figure 1: Conceptual framework linking SC-DD-CE



Source: Author's elaboration

The proposed conceptual framework of the input-output is based on three assumptions: firstly, we assume that the ingredients of SC, cognitive and structural social capital, do not interact, they follow a linear logic, which implies that cognitive social capital, whether it is offline or online, acts independently from structural social capital in DD. The second assumption is that the first inputs are considered offline social capital that enables online social capital. Finally, we assume no correlation between the pathways leading from DD to CE.

2. Methodology

Understanding and harnessing the relationship SC-DD-CE as an input-output model, can help individuals, organisations, and policymakers promote inclusive digital transformation that leverages and enhances CE development. In the following section we will operationalise the input-output logic.

2.1 Research Design

We apply a descriptive research design to examine the relationship between SC-DD and CE. The use of secondary data and review of studies has provided a comprehensive overview of the relationship between these variables, which will be further developed in the context of circular economy.

2.2 Data Collection

The data collection process consists in searching for relevant secondary sources such as academic publications, reports, and databases related to social capital, digitalisation, and circular economy. The data collection is conducted using keywords such as "social capital," "digitalisation," and "circular economy". Academic databases like PubMed, Scopus, and Web of Science are used to identify peer-reviewed articles. At the same time, reports from reputable organizations such as the World Bank, United Nations, OECD, USAID and other relevant government agencies will also be considered to analyse SC, digitalisation and CE in Albania.

2.3 Data Approach

A systematic review and thematic analysis are conducted once the relevant studies are identified and selected. The relevant information related to the relationship between social capital, digitalization, and circular economy is extracted. Themes and patterns will be identified to provide an overview of the findings and the nature of the relationship between SC digitalization and CE through indexes provided by reputable organizations such as the World Bank, the United Nations, and other relevant government agencies. Two measurement indexes are an excellent example, the Knowledge Economy Index (World Bank) and Network Readiness Index (World Economic Forum).

The Knowledge Economy Index (KEI) assesses a country's ability to create, disseminate, and utilise knowledge to drive economic growth and innovation. It evaluates various factors, including education, information and communication technology (ICT) infrastructure, research and development (R&D) capabilities, and the overall information society. While, the Network Readiness Index (NRI)[18] assesses a country's preparedness to leverage information and communication technologies for socio-economic development. It evaluates factors such as ICT infrastructure, ICT usage, government policy, and the impact of ICT on the economy and society. In the present study, we will first use these indexes to identify the indicators highlighting the reciprocal relationship between SC and DD. Also, from the review and the analysis of the reports of UN, EU and similar studies a list of digital indexes have been identified see Tables 1,2,3.

Table 2: Digitalisation development indexes

Index name	Name and purpose indexes	Indicators	Albania ranking	Source of information
ISI	**Information society index (ISI) is a composite index that measures the level of information and communication technology (ICT) development and its impact on society**	1. Fixed-telephone subscriptions per 100 inhabitants 2. Mobile-cellular telephone subscriptions per 100 inhabitants 3. International Internet bandwidth (bit/s) per Internet user 4. Percentage of households with a computer 5. Percentage of households with Internet access 6. Percentage of individuals using the Internet. 7. Fixed-broadband subscriptions per 100 inhabitants. 8.Active mobile-broadband subscriptions per 100 inhabitants. 9.Mean years of schooling rate Gross enrolment ratio (secondary and tertiary level) According to UIS, the gross enrolment ratio is "the total enrolment in a specific level of education, regardless of age, expressed as a percentage of the eligible official school-age population corresponding to the same level of education in a given school-year."	Specific indicator analysis	ITU Office for Europe (EURregion@itu.int)
NRI	**Network Readiness Index**	The Network Readiness Index (NRI) comprises pillars, sub-pillars, and indicators to assess a country's readiness to leverage information and communication technologies (ICTs). The index consists of the following pillars, which represent broad areas of assessment	80th among 131 economies included in 2022	ITU-UN

Source: Author's elaboration

It is shown that there are overlapping indicators-sub indicators among DD indexes, no matter the scope of their measurement (See Table 1, 2, 3). However, this first inventory helps to identify the best indexes that can be used for this study, which capture, at the same time, SC indicators, DD

[18] *The Network Readiness Index 2022, Stepping into the New Digital Era How and Why Digital Natives Will Change the World*, 2022), a sample of indicators is selected based on the mentioned report

development and possibilities to extract proxy indicators for CE. Indexes such as ISI, IDI, DAI, ICT-OI, ERI and DESI offer a narrow view of digitalisation development since they do not collect data on SC and Human capital; see Table 1,2,3 for further information on the DD indexes and indicators. DESI in Albania provides till now only 75% of the indicators that is why is excluded for the indicators selection process. Similarly, the rationale for selecting KEI and NRI indexes to achieve the study objective is based on the assumptions explained below. The first step in the analysis of the SC-DD-CE relationships, consists of selecting the indexes of SC and DD.

Table 3: Digitalisation development indexes

Index name	Name and purpose indexes	Indicators	Albania ranking	Source of information
KEI	Knowledge Economy index	The knowledge economy is an economic system that relies on producing, disseminating, and utilising knowledge and information as critical drivers of economic growth and innovation. Based on 4 pillars An economic and institutional regime to provide incentives for the efficient use of existing and new knowledge and the flourishing of entrepreneurship; An educated and skilled population to create, share, and use knowledge well; An efficient innovation system of firms, research centers, universities, consultants and other organizations to tap into the growing stock of global knowledge, assimilate and adapt it to local needs, and create new technology; Information and communication technology to facilitate the effective creation, dissemination, and processing of information.	Albania is a moderate performer in terms of its knowledge infrastructure. It ranks 68th out of 132 countries in the Global Knowledge Index 2022 and 12th out of the 28 countries with high human development.	EUROPEAN BANK FOR RECONSTRUCTION AND DEVELOPMENT
EGDI	E Government Developme	The EGDI is computed on a scale from 0 to 1, where a higher score indicates a higher level of e-government development. It provides insights into the digitalization efforts of governments, the inclusiveness of digital services, and the impact on public service delivery and citizen engagemenThe EGDI is calculated using three sub-indexes: Online Service Index (OSI): Measures the availability and maturity of online services provided by governments, including information dissemination, transactional services, and e-participation platforms. Telecommunication Infrastructure Index (TII): Assesses the level of access to and quality of telecommunication infrastructure, including indicators like fixed and mobile telephone subscriptions, internet connectivity, and broadband access. Human Capital Index (HCI): Evaluates the digital skills and capacity of individuals to utilize e-government services, including literacy rates, educational attainment, and ICT skills.	E-Government Development Index 0.7413 Rank 63 of 193 E-Participation Index 0.7614 Rank 22 of 193	UNDP

Before that, structuring social capital into two main types, cognitive and structural social capital (Kokthi et al., 2021), helps us better understand their specific role in the DD and, consequently, in CE pathways. Cognitive social capital (CSC) refers to intangible shared norms (whether formal or informal), values, beliefs, and knowledge among individuals or groups within a community or society. It emphasises the cognitive aspects of social relationships and how they contribute to building trust, cooperation, and mutual understanding. At the same time, structural social capital (SSC) refers to the tangible social resources embedded in social networks and structures. SSC is based on the connections and interactions among individuals and groups. SSC involves the presence and quality of social networks, business networks, community organisations, social media connections, and professional associations, which provide access to information, resources, and support. We will use the KEI to measure the offline CSC and Network Readiness Index (NRI) for online CSC/e-social capital. Regarding CSC offline indicators, *1. Corruption perception index, 2. Rule of law, 3.Government effectiveness, 4. Regulatory quality, and 5. Political stability* are used as a proxy for offline CSC. At the same time, we will use the E-social capital indicators from the NRI index as follows: *1. Secure Internet servers. 2. Cybersecurity, 3. Regulatory quality, 4. ICT regulatory environment, and 5. Regulation of emerging technologies, 6. E-commerce legislation 7. Privacy protection by law content.* Furthermore, we propose for the offline SSC, the *1. Linkage Industry-University and for the online SSC E-participation index, and Online service* index (KEI data) and for the e-SSC, 1. *Firms with websites, 2. The Prevalence of the Gig*[19] *economy,* The interplays between SC-DD-CE through three pathways: *1. Innovation and Technology Adoption through digital connectivity, 2.Knowledge sharing through market access, 3. Education and Human Capital with digital skills and literacy* (see Figure 3*).* The first pathway, indicates a country's capacity to foster innovation and adopt cutting-edge technologies through robust digital infrastructure and connectivity, facilitating seamless communication and coordination among participants in circular economy networks and promoting the circular economy's advancement through novel solutions and business models see Table 4 and 5 for the indicators and Figure 3 for the selected indicators. The second pathway, suggests that a strong knowledge economy encourages information sharing and cross-sector partnerships, fosters e-commerce development and digital marketplaces,

[19]A gig economy is a labor market that relies heavily on temporary and part-time positions filled by independent contractors and freelancers rather than full-time permanent employees.

expands circular economy opportunities and makes circular products and services more accessible to consumers. The third one, suggests that if a country invests in digital literacy and skills development, equipping individuals and businesses with the know-how to leverage technology effectively for circular economy practices.

Table 4: Digitalisation development indexes

Index name	Name and purpose indexes	Indicators	Albania ranking	Source of information
IDI	**ICT Development index**	The ICT Development Index (IDI) is a composite indicator that until 2017 combined 11 indicators into a composite score. It is used to monitor and compare developments in information and communication technology (ICT) between countries and over time. The IDI was published from 2009 to 2017.		ITU-UN
DAI	**Digital Access index**	The Digital Access Index is an indicator that measures the level of digital access and connectivity within a country. It assesses various factors such as internet penetration, affordability of internet services, availability of ICT infrastructure, and digital literacy. The DAI is often used to gauge the digital divide and identify areas that require improvement to enhance digital inclusion.	Specific indicator analysis	ITU-UN
ICT-OI	**ICT opportunity index**	The ICT Opportunity Index is the merger of two wellknown initiatives, ITU's Digital Access Index (DAI) and Orbicom's Monitoring the Digital Divide/ Infostate conceptual framework and model. The conceptual framework of the index introduces the notions of a country's infodensity and info-use. Infodensity refers to the slice of a country's overall capital and labour stocks, which are ICT capital and ICT labour stocks and indicative of productive capacity. Info-use refers to the consumption flows of ICTs. Technically, it is possible to aggregate the two and arrive at the degree of a country's 'ICT-ization', or infostate	Specific indicator analysis	ITU-UN
DESI	**Digital Economy and Socie**	The Digital Economy and Society Index (DESI) is a composite index developed by the European Commission to measure the digital performance and competitiveness of European Union (EU) member states. The DESI assesses various dimensions of the digital economy, including connectivity, digital skills, use of digital technologies by individuals and businesses, digital public services, and digital integration.	Specific indicator analysis	European Commission
ERI	**E Readiness Index**	The UN e-government readiness index is a composite index that measures the capacity of governments to develop and implement e-government services. The index ranges from 0 (low level of readiness) to 1 (high level). Constructed within the UN global e-government survey framework, the indicator consists of three sub-indices: the web measure index, the telecommunication infrastructure index and the human capital index.	Specific indicator analysis	UN

3. Data analysis and discussion

The analysis of the data on the indicators will follow the input-output logic. Based on SC, higher levels of social capital often lead to greater trust between citizens and institutions. When there is a high level of trust, individuals are

more likely to cooperate and report corrupt practices, leading to a more transparent environment that can help reduce corruption. As shown in the conceptual framework, CSC is represented by five indicators linked to the governance dimension of KEI.

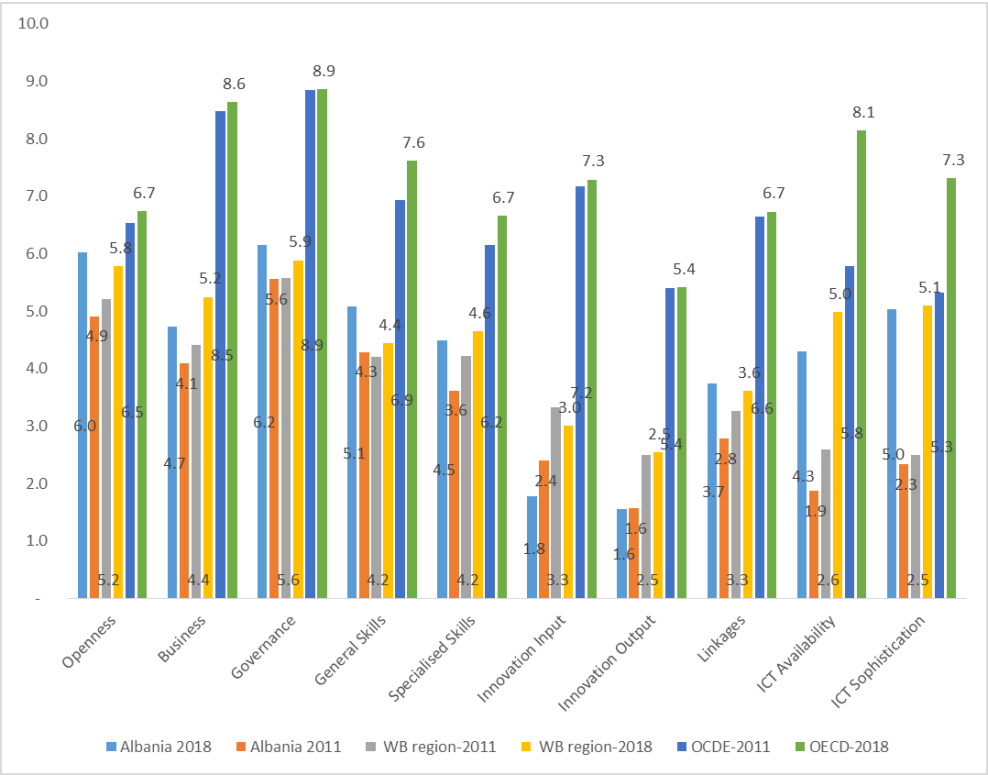
1. The Corruption Perception Index, showing the perceived level of public sector corruption, show the lowest score among the other indicators. Albania scores 3.6 out of 10, with a slight difference with WB scoring (3.8) and a significant difference with OECD countries (8.3). This indicator is used in literature also as a proxy for trust in institutions (Paldam, 2000; Pena López & Sánchez Santos, 2014). With a low level of trust, individuals are less likely to cooperate and report corrupt practices leading to a less favourable environment that can help reduce corruption.

2. The rule of law refers to a society where laws are applied consistently and transparently, and the law binds the government and its officials. Albania shows the lowest position compared to the WB region (4 vs 4.3) and a higher difference with OECD countries (4 vs 8.8). In societies with low social capital, people are less likely to comply with the law and respect legal institutions (Berggren & Jordahl, 2006; Paldam, 2000). Related to the third indicator, **government effectiveness**, the KNE index scoring show that Albania displays the same pattern as the WB region but is far behind the OECD countries (5 vs 8.9) see Table 4. As indicated in Table 4, Regulatory quality and political stability are good for Albania and the rest of WB with slight differences with OECD countries. **Although Social capital** is a separate concept encompassing norms of trust and reciprocity within a society, it can contribute to better governance and improve the five above indicators. Since the indicators mentioned above-set pathways for developing the e-economy, we have referred to them as offline SC. Similarly, as many aspects of life now rely on online connectivity, the amount of data generated daily is growing exponentially and is expected to continue to do so. This is raising new concerns regarding our individual and collective ability to derive value from data and the governance that should be put into practice around data and data flows. From this perspective, trust is crucial in the context of the network economy, reflected in an environment conducive to trust and the trusting behaviour of the population. Trust is one of the cognitive aspects of SC and is used as a sub-pillar in the governance aspect of the NRI index. NRI maps the network-based readiness landscape of 131 economies. Within the Trust sub-pillar, we have considered the following indicators as e-social capital 1. *Secure Internet servers. 2. Cybersecurity, 3. Regulatory quality, 4. ICT regulatory environment, 5. Regulation of emerging technologies, 6. E-commerce legislation and 7. Privacy protection by law content.* The best rank within the trust sub-

pillar/governance is Secure Internet Servers, 66th out of 131 economies, with online access to financial accounts 112th out of 131 being the worst. At the same time, in the regulation sub-pillar *ICT regulatory environment*, Albania is ranked 45th and *Privacy protection by law* 47th out of 131, showing the best rank. However, E-commerce legislation shows the worst position in this sub pillar (see Table 5). Albanian legislation provides measures and regulations to protect digital security and privacy through several laws and protection institutions. Nevertheless, in 2021 there were two significant leaks of citizens' data, including personally identifiable information such as salaries, official identification numbers, names and dates of birth. The importance of protecting personal data poses a big issue on the current level of data security. According to USAID,IREX, (2022) in the media sector, agencies or companies secure their platforms through outsourcing; consequently, minor digital security training is developed. The police service also need more capacity to investigate cybercrime, and citizens need to be made aware of the risks of the internet and the steps they can take to protect themselves. Low trust in cybersecurity can have a significant impact on digital transformation in several directions, by undermining confidence in the organisation's ability to protect customer data, intellectual property and other critical information. Slowing digital transformation, as individuals may prefer traditional methods due to cybersecurity concerns; slowing innovation, as they may be more reluctant to explore new technologies due to perceived risks. Organisations must prioritise cybersecurity as a core component of their transformation strategy to mitigate these challenges and foster trust in cybersecurity during digital transformation. In summary, the governance aspects being in the offline or/and online realm conceptualised in this paper as offline CSC and e-CSC governance dimensions can act as barriers to DD. Societies such as Albania that score poorly in these areas are less likely to create an environment conducive to innovation, investment, and growth in the digital sector and, consequently, Circular Economy. Regarding the structural aspect of SC, for the offline SSC, the Linkage Industry-University indicator, Albania shows a poor score according to the latest KEI dataset (see Figure 2). The latest score for Albania is 4.4 out of 10. Even though compared to the WB region, the scoring of Albania is better, it needs to catch up with OECD countries. Vis-à-vis the e-SSC indicators, Albania's E-participation index score is 6.8 out of 10, vs 6.5 of the WB region, while the OECD score is 8.6. Also, Albania's latest data on the online service index (KEI latest data) show a higher score than the WB region but it still has to catch up with the OECD countries at 8.7 out of 10. Firms with websites indicator in Albania score 58.11 out of 100 as per the NRI index 2022, ranking Albania the 54th out of 131 economies, showing a good position.

However, regarding the prevalence of the Gig economy indicator, Albania scores 26.7 out of 100 and is ranked 100th in 131 countries. Mobile connectivity, payment systems and digital development offer an essential pool for Albania's development of this employment sector. However, the governance performance around the issues of cybersecurity and legislation implementation and enforcement has an essential impact on Gig workers. On that end, the relationship between online and offline SSC is reciprocal; the same logic for the offline-e CSC. Yet, additional studies are needed to prove empirically this relationship suggested in the conceptual framework involving several stakeholders making use of the primary data.

Figure 2: Knowledge economy dimensions scoring comparison of Albania with WB and OECD countries

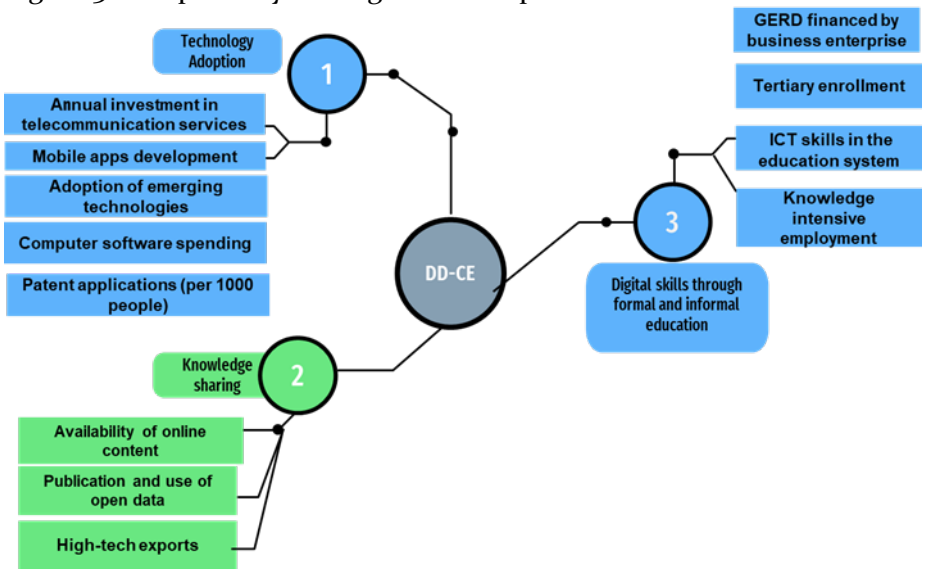


Source: Elaborated from UN dataset

Following the conceptual framework linking SC-DD-CE, digital development and the reciprocal relationship with SC also serve as a mediator factor toward the transition to CE. Indicators linked to DD are shown in Table 4 and Table 5. Albania is a moderate performer in terms of its knowledge infrastructure. It

ranks 68th out of 132 countries in the Global Knowledge Index 2022. The indicators used in the aggregation of ICT availability and ICT sophistication are shown in Table 4. Albania shows an outstanding improvement from the baseline year, 2011; this trend is also shown in the WB region and OECD (See Figure 2). WB region performs better in ICT availability and sophistication than Albania. However, both reside behind the OECD countries. This analysis has a twofold objective, first, to examine the digital development of Albania but also to discern the indicators to be used in the input-output model provided in this study. Although digitalisation development and its transformation is a global imperative in today's data-driven world, the measurement and indicators used to identify it should reflect the latest development (*The Network Readiness Index 2022*). In that regard, the use of KEI with NRI not only accommodates the latest changes in the digitalised context and gives the inputs for the pathways toward CE. The analysis of the indexes from the NRI dataset show the indicators where Albania has the best and the worst performance.

Figure 3: The pathways of Digital Development[20]



Source: Adapted from NRI indicators

[20] Gross domestic expenditure on R&D (GERD) includes expenditure on research and development by business enterprises, higher education institutions, as well as government and private non-profit organisations

The technology and knowledge-sharing pathway show a long way to improvement in Albania. Being the 92nd out of 131 for technology adoption reflects the institutional transition of society in the last 30 years. Regarding the third pathway, even though Albania shows a good position in the Adult Literacy rate, 28th out of 131 economies (NRI,2022), it is not a precondition for the digital development of Albania because the HEI still needs to update the curricula to the market needs. Knowledge-intensive employment also highlights this trend, which shows a low score of 26.8 out of 100. The digital transformation of the economy and the current innovation-oriented labour market requires an essential effort from all the societal actors, especially Higher Education Institutions (HEIs).

4. Conclusions

Albania`s pathway to a circular economy and its commitments to the Green Deal can only be tracked with an understanding of the country`s digital development context, as we are in the process of unprecedented transformation under technological disruption. The latter can only be recognised with a comprehensive institutional perspective analysis. In this regard, an input-output model is used that explores the interplay between social capital-digital development and circular economy, with SC as an input in the model that enhances or inhibits DD. At the same time, DD is understood as a mediator for the transition to CE. The Knowledge Economy Index and the Network Readiness Index are used to operationalise the proposed conceptual model. The examination of KNE and NRI through the lens of our conceptual model shows that a low level of social capital is also associated with low DD. The three -pathways analysis also shows that Albania has low technology adoption indexes, low knowledge sharing and low digital literacy. Their improvement can lead to the efficient use of natural or social resources. The input-output conceptual model can simulate the outcomes of using SC and DD in future studies with primary data.
Strategic digital development initiatives that emphasise trust, digital skills training and digital literacy programmes can empower individuals and communities, thereby increasing social capital. The use of digital platforms and technologies for citizen engagement and participatory decision-making processes can promote transparency, accountability and trust, thereby strengthening social capital. Similarly, promoting digital media literacy and critical thinking skills can enable individuals to navigate information environments effectively, thereby preserving social capital. Further mixed-methods studies covering the dimensions of digital development and social

capital can comprehensively understand their interplay in Albania. This data can help identify specific challenges and opportunities, inform policy interventions, and guide the development of strategies that promote digital development while preserving and enhancing social capital. Additional studies are needed to empirically validate the model with possible interactions between structural and social capital as input in the relationship between digital development and circular economy.

Study limitations

The study has several limitations. First, the reliance on secondary data may limit the scope and depth of the analysis. Secondly, the quality and availability of the identified data sources may vary, potentially affecting the reliability of the findings. Finally, as the study is based on existing literature, it may need to capture the latest developments in the field, which is changing at a critical speed reflecting digital transformation. However, the proposed input-output model, which can be used to understand the dynamics of the ecosystem in which digitalisation takes place, somewhat reduces the identified limitations.

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63. Annexes

Table 5: Knowledge economy dimensions and respective indicators

KEI Dimensions	Albania 2018	Albania 2011	Difference	WB region-2011	WB region-2018	OCDE-2011	OECD-2018
Dimension 1: Openness							
Foreign direct investment (% GDP, mov	3.2	3.4	(0.2)	3.2	2.9	2.5	2.5
Applied tariff rates (weighted mean)	9.5	7.1	2.4	7.4	8.0	9.0	9.0
Trading across borders	9.7	7.5	2.2	7.4	9.5	8.8	9.4
International migrant stock (% population)	1.7	1.7	0.1	2.8	2.8	5.8	6.1
Dimension 2: Business							
Ease of doing business	6.6	5.4	1.2	5.2	7.2	8.5	8.8
Dimension 3: Governance							
Corruption perception index	3.6	3.0	0.6	3.8	4.0	8.1	8.3
Rule of law	4.0	3.9	0.1	4.3	4.5	8.8	8.8
Government effectiveness	5.0	4.3	0.7	4.4	4.9	8.9	9.0
Regulatory quality	6.1	6.2	(0.1)	6.2	6.2	9.0	9.1
Political stability	7.3	6.2	1.2	6.1	6.6	8.7	8.5
Dimension 4: General Skills							
Secondary school enrolment rates (% g	4.9	4.2	0.7	4.3	4.2	5.6	6.8
Average years of schooling	5.2	4.4	0.9	4.1	4.7	8.3	8.4
Years of experience of top managers	1.0	1.6	(0.6)	3.8	4.7	2.9	5.0
Proportion firms offering formal training	3.3	2.9	0.4	4.1	5.2	8.8	5.7
Dimension 5: Specialised Skills							
Tertiary enrolment rates (% gross)	5.4	4.0	1.3	4.0	4.2	5.9	5.9
Technicians in R&D (per million people)	1.0	1.0	-	1.8	1.6	5.8	6.1
Quality of math and science education	6.2	5.9	0.3	6.0	5.7	7.6	7.8
Quality of education system	6.5	5.5	1.0	4.5	3.9	8.1	7.8
Proportion firms with inadequately trained workforce	8.1	4.4	3.7	5.4	7.1	4.0	8.4
Dimension 6: Innovation Input							
Gross spending in R&D (% GDP)	1.4	1.4	-	2.2	2.1	7.2	7.4
GERD financed by business enterprises	1.3	1.3	-	3.0	3.4	7.4	7.3
Proportion Firms engaging in R&D	1.2	6.3	(5.1)	6.6	3.1	6.6	5.7
Researchers in R&D (per million people)	1.0	1.0	-	2.1	2.1	6.3	7.0
Intellectual property rights protection	4.0	2.1	2.0	2.7	4.3	8.4	9.1
Dimension 7: Innovation Output							
Patent applications (per 1000 people)	1.0	1.2	(0.1)	1.1	1.1	3.3	3.2
Proportion firms introducing new produc	2.2	2.2	-	5.1	5.1	9.1	8.9
Net IP payments (moving average)	1.7	1.7	(0.0)	1.7	1.7	2.7	3.0
Scientific and technical journal articles (p	1.3	1.2	0.1	2.1	2.3	6.5	6.6
Dimension 8: Linkages							
University-industry linkages	4.4	1.6	2.8	3.6	3.7	8.3	7.8
Venture capital availability	3.1	2.3	0.8	2.9	3.4	5.0	7.2
Proportion firms using foreign-licensed t	4.6	4.6	-	4.5	4.5	3.7	3.7
Firm-level technology absorption	4.0	4.1	(0.1)	3.1	3.4	8.3	7.3
Value chains breadth	2.7	1.3	1.3	2.3	3.1	7.9	7.7
Dimension 9: ICT Availability							
Fixed broadband subscriptions (per 100	2.9	1.8	1.2	3.2	4.6	7.2	8.6
Active mobile broadband subscriptions (	5.7	2.0	3.7	2.0	5.4	4.4	7.7
Dimension 10: ICT Sophistication							
E-participation index	6.8	2.2	4.6	2.4	6.5	6.4	8.6
Online service index	6.2	3.6	2.6	3.5	5.8	7.1	8.7
International internet bandwidth per inter	2.1	1.2	0.9	1.6	3.0	2.4	4.6

Source: UNDP, 2022

Table 6: Network Readiness index for Albania

Indicator	Rank	Score	Indicator	Rank	Score
A. Technology pillar	94	35.3	**B. Governance pillar**	92	49.12
1st sub-pillar: Access	86	57.11	*1st sub-pillar: Trust*	79	36.6
1.1.1 Mobile tariffs	84	48.1	3.1.1 Secure Internet servers	66	54.15
1.1.2 Handset prices	77	47.01	3.1.2 Cybersecurity	86	63.69
1.1.3 FTTH/building Internet subscriptions	54	27.96	3.1.3 Online access to financial account	112	8.62
1.1.4 Population covered by at least a 3G r	53	99.74	3.1.4 Internet shopping	62	19.9
1.1.5 International Internet bandwidth	101	63.05	*2nd sub-pillar: Regulation*	63	64.4
1.1.6 Internet access in schools	47	56.81	3.2.1 Regulatory quality	60	47.47
2nd sub-pillar: Content	84	31.73	3.2.2 ICT regulatory environment	45	87.06
1.2.1 GitHub commits	58	7.07	3.2.3 Regulation of emerging technologie	53	48.42
1.2.2 Internet domain registrations	62	4.85	3.2.4 E-commerce legislation	87	66.67
1.2.3 Mobile apps development	63	80.49	3.2.5 Privacy protection by law content	47	72.4
1.2.4 AI scientific publication	74	34.49	*3rd sub-pillar: Inclusion*	107	46.37
3rd sub-pillar: Future Technologies	122	17.06	3.3.1 E-Participation	36	83.95
1.3.1 Adoption of emerging technologies	116	19.18	3.3.2 Socioeconomic gap in use of digital	12	32.5
1.3.2 Investment in emerging technologies	117	21.75	3.3.3 Availability of local online content	118	26.2
1.3.3 Robot density	NA	NA	3.3.4 Gender gap in Internet use	57	69.33
1.3.4 Computer software spending	87	10.25	3.3.5 Rural gap in use of digital payments	117	19.8
C. People pillar	48	49.8	**D. Impact pillar**	79	51.79
1st sub-pillar: Individuals	69	47.55	*1st sub-pillar: Economy*	111	16.34
2.1.1 Mobile broadband internet traffic withi	89	2.56	4.1.1 High-tech and medium-high-tech ma	100	2.6
2.1.2 ICT skills in the education system	78	39.05	4.1.2 High-tech exports	108	2.62
2.1.3 Use of virtual social networks	78	60.27	4.1.3 PCT patent applications	99	0
2.1.4 Tertiary enrollment	54	38.21	4.1.4 Domestic market size	105	36.55
2.1.5 Adult literacy rate	28	97.64	4.1.5 Prevalence of gig economy	100	26.74
2.1.6 AI talent concentration	NA	NA	4.1.6 ICT services exports	66	29.52
2nd sub-pillar: Businesses	43	51.91	*2nd sub-pillar: Quality of Life*	47	73.89
2.2.1 Firms with website	54	58.11	4.2.1 Happiness	85	54.79
2.2.2 GERD financed by business enterpris	NA	NA	4.2.2 Freedom to make life choices	56	76.69
2.2.3 Knowledge intensive employment	81	26.18			
2.2.4 Annual investment in telecommunicati	94	71.44	4.2.3 Income inequality	25	80.9
3rd sub-pillar: Governments	*46*	49.96	*3rd sub-pillar: SDG Contribution*	65	65.12
2.3.1 Government online services	31	83.64	4.3.1 SDG 3: Good Health and Well-Bein	91	55.55
2.3.2 Publication and use of open data	49	33.82	4.3.2 SDG 4: Quality Education	54	37.34
2.3.3 Government promotion of investment	82	32.4	4.3.3 SDG 5: Women's economic opportu	32	87.72
2.3.4 R&D expenditure by governments and higher education			4.3.4 SDG 7: Affordable and Clean Energ	16	90.14
2.3.4 R&D expenditure by governments and	NA	NA	4.3.5 SDG 11: Sustainable Cities and Co	82	54.88

Source: UNDP, 2022

A Roadmap for Digital Transformation after the Pandemic in Albania - Literature review

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Abstract
In the recent years, following the global pandemic that witnessed a surge in digital progress, countries worldwide are actively embracing digital transformation strategies to encourage innovation, drive economic growth, and promote social advancement. The intersection of fast-paced technological advancements, changing consumer patterns, and growing competitive pressures has prompted businesses to adopt digital transformation as a crucial approach to not only survive but thrive in the digital age.
The goal of this research is to establish a comprehensive roadmap for digital transformation and provide comprehensive support throughout the entire journey. We aim to address the various facets and complexities involved in this transformative process, assisting organizations in navigating the challenges and realizing the full potential of digital transformation.
When embarking on any transformative journey, it is crucial to establish well-defined steps and procedures. In the case of digital transformation, this process begins by examining and defining the concept itself. This entails reviewing existing literature, academic papers, and insights from researchers and consultants who have explored various approaches to this subject matter. Interestingly, this paper sheds light on the divergent opinions among researchers regarding the most effective means of supporting digital transformation.

Keywords - Digital Transformation, Artificial Intelligence, Implementing of technology, Big Data, Internet of Things, etc.

1.Introduction

After pandemic, in this last years, characterized by rapid digital advancements, nations across the globe are actively adopting strategies for digital transformation to foster innovation, stimulate economic growth, and facilitate social progress. The convergence of rapid technological advancements, evolving consumer behavior, and intensifying competitive forces has compelled businesses to embrace digital transformation strategies as a means to not only survive but also flourish in the digital era.

Digital transformation has undergone a significant shift in perception, transitioning from a mere influence on individuals' work to a potent instrument capable of revolutionizing every facet of a company's functioning, including operational and business development domains. This comprehensive paradigm entails the incorporation of digital technologies into diverse processes, such as analyzing consumer behavior, automating labor-intensive tasks, and promptly detecting fraudulent transactions. Initiating a successful digital transformation requires a strategic focus on selecting and implementing the appropriate technology as a foundational step.

Digital transformation holds the potential to revolutionize various processes within a company's operational landscape. It encompasses the application of digital technologies in consumer behavior analysis, enabling the development of products that align with evolving customer needs. Additionally, digital transformation enables the automation and digitalization of labor-intensive sub-processes, optimizing efficiency and productivity. By leveraging these capabilities, organizations can enhance their agility, adaptability, and overall performance in an increasingly digital world.

Economic progress often emerges as a result of various societal changes, and one of the latest manifestations of such change is digital transformation. Researchers and experts have dedicated their efforts to closely examining this emerging phenomenon in order to understand its implications, benefits, limitations, and impact on social practices and employment. The primary objective has been and continues to be facilitating a successful and efficient digital transformation.

When delving into the literature on digital transformation, it becomes evident that definitions vary depending on different perspectives and perceptions [1]. In this paper, we define digital transformation as a novel model of development that necessitates a reevaluation of the relationships between companies, institutions, their stakeholders, and customers, as well as a reassessment of previous approaches to delivering services and products [2]. This definition recognizes that companies undergo a multidimensional transformation during this process.

On one hand, there are proponents who argue for limited support through strategic guidance, while on the other hand, there are advocates for comprehensive involvement, offering detailed operational guidelines for achieving successful transformation. This raises the question: what level of detail is necessary for the successful implementation of digital transformation?

To address this query, this paper is structured into five main sections. The first section introduces the research context and objectives of the paper. The second and third sections try to explain the significance of digital transformation and the implementation of the technology. How to develop and lead an efficient digital transformation? The fourth outlines the chosen methodology employed in this study. In the end, the main findings and discussions are presented. The paper concludes by presenting key takeaways and future perspectives to consider in the fifth section.

2. The Importance of Digital Transformation

Digital transformation encompasses the holistic integration of digital technologies throughout the fabric of an organization, institution or society, resulting in a fundamental shift in operational paradigms and value creation mechanisms. For Albania, embarking on a path of digital transformation brings forth a multitude of advantages. Primarily, it enhances government efficiency by optimizing administrative procedures, minimizing bureaucratic hurdles, and enhancing the efficacy of citizen-centric service delivery. By leveraging digital tools and technologies such as cloud computing, artificial intelligence, big data analytics, and the Internet of Things, organizations can gain actionable insights, automate processes, personalize interactions, and deliver value in ways previously unimaginable. Digital transformation also helps organizations and institutions adapt to changing market dynamics, stay ahead of competitors, and future-proof their business models [7].

The concept of digital transformation is multifaceted, and its interpretation varies among individuals in the business world and beyond. Many business leaders mistakenly perceive digital transformation as solely driven by innovative technologies, without fully grasping the underlying motivations.

This approach is counterproductive and often leads to failure. To establish a successful business transformation strategy, it is essential to first identify the core goals and requirements of the organization\institution and then build the digital transformation strategy around these objectives. The most effective starting point is to align the digital transformation strategy with the organization's strategic goals, which may be outlined in a 5-to-10-year business plan. To effectively execute digital transformation and achieve the goals, it is

crucial to have a comprehensive understanding of how digital transformation aligns with the business values, goals, and objectives [8].

3. Implementing the Technology

The foundation of a successful digital transformation lies not in technology, but in formulating an effective business strategy. Once have grasped the purpose of digital transformation of the organization, aligning with the goals and vision, the subsequent stage involves outlining the technology strategy wishing to implement. Technology serves as a critical enabler in realizing your desired objectives.

3. 1 Developing an Efficient and Outstanding Digital Transformation

Digital transformation is a multifaceted concept that extends beyond organizational transformation alone. Many organizations tend to solely prioritize organizational change while disregarding the other dimensions or forms of digital transformation. This narrow focus restricts them from fully embracing and reaping the extensive advantages and rewards that digital transformation encompasses.

Digital transformation is not a monolithic entity in itself. Often, companies concentrate exclusively on transforming their organizational structure, overlooking the existence of four distinct types of innovation. Consequently, they inadvertently restrict their ability to harness the full potential and benefits that digital transformation has to offer.

- **Process Transformation**

In the realm of business, there has been a significant focus on leveraging various technologies such as artificial intelligence, machine learning, analytics, and data to revamp and optimize business processes. The primary objectives have been to streamline operations, decrease cycle times, enhance quality, and reduce costs. Process transformation stands as a crucial element in any digital transformation strategy that aims to drive success. It holds the potential to generate substantial value and deliver profound improvements within organizations.

- **Business Model Transformation**

While process transformation concentrates on specific areas within a business, Business Model Transformation delves into the fundamental building blocks that define how value is delivered in an industry. Through digital transformation strategies, companies harness the power to reshape traditional business models and adapt them to the evolving digital landscape. This

enables organizations to stay relevant, seize new opportunities, and unlock greater value for their stakeholders.

- **Cultural/Organizational Transformation**

To achieve sustainable digital transformation across industries, it is crucial to undertake a comprehensive reevaluation of an organization's capabilities, talent pool, mindsets, and processes, aligning them with the demands of the digital era. Leading organizations acknowledge that digital transformation necessitates the adoption of flexible workflows, decentralized decision-making processes, continuous learning, and a greater reliance on collaborative business ecosystems. By embracing these principles, organizations can navigate the dynamic digital landscape and position themselves for long-term success in the ever-evolving digital world.

3.2 Lead Your Organization / Institution Towards Digital Transformation

A successful digital transformation has far-reaching impacts on customers, employees, and partners alike. The key to achieving this success lies in garnering the full support and unwavering loyalty of your workforce. To ensure their commitment, it is crucial to consider the following factors: [2,8].

- **Effective Communication**: Open and transparent communication channels are vital during a digital transformation. Clearly articulate the vision, goals, and benefits of the transformation to your employees. Keep them informed about the progress and address any concerns or questions they may have. Regularly engage in dialogue to foster a sense of involvement and ownership.
- **Empowerment and Inclusion**: Involve your employees in the transformation process by soliciting their input and ideas. Empower them to contribute to decision-making and problem-solving. Recognize and celebrate their achievements and contributions. Foster a culture that values diversity and inclusion, allowing everyone to feel heard and respected.
- **Training and Skill Development**: Provide ample training and development opportunities to equip your workforce with the necessary skills and knowledge for the digital transformation. Offer both technical and soft skills training to ensure they are prepared for the changing demands of the digital landscape. Support continuous learning and create a culture of upskilling and reskilling.
- **Change Management**: Recognize that change can be met with resistance. Implement a robust change management strategy that addresses potential

challenges and mitigates resistance. Involve change champions within your workforce who can advocate for the transformation and help their colleagues embrace the changes positively.

- **Rewards and Incentives**: Recognize and reward employees for their efforts and achievements during the digital transformation. Provide incentives that align with the desired outcomes and motivate them to actively participate and contribute to the success of the transformation. This can be through performance bonuses, promotions, or other forms of recognition.
- **Well-being and Work-Life Balance**: Prioritize the well-being of your employees during the transformation process. Provide support mechanisms to help them manage stress and maintain work-life balance. Encourage a healthy and positive work environment that promotes physical and mental well-being.
- **Cultivate a Culture of Creativity and Innovation**
  Companies that underestimate the importance of fostering creativity and innovation within their teams are setting themselves up for inevitable failure. It is essential to establish a system that encourages and values the input of your employees in driving the business forward. Remember, being the employer does not automatically imply having all the answers. To truly achieve your desired goals, you must actively seek and embrace the contributions of your team.

By focusing on these aspects, you can foster a supportive and engaged workforce that is committed to the digital transformation journey. When employees feel valued, empowered, and equipped, they become catalysts for positive change and contribute to the overall success of your digital transformation efforts.

4. Research method

This research provides a detailed explanation of the research methodology employed to examine the existing literature on digital transformation processes. It is crucial to gain a comprehensive understanding of the various academic endeavors in this field and how they align or diverge when studying the process of digital transformation. To achieve this, the methodology involved an extensive review of research papers on digital transformation from recent years.

Specific keywords such as "digital transformation roadmap," "digital transformation process," and "digital transformation steps" were used during the review process. This resulted in the selection of a collection of articles and

white papers that formed the basis of the study. Each of these sources was thoroughly analyzed, focusing on the suggested processes of digital transformation and employing data representation methods such as diagrams, models, and step-by-step approaches. [6]
To enhance the accessibility of the data, these phases were then categorized into broader groups based on semantic intersections and similarities observed within the reviewed content. This categorization covered all phases and insights discussed in the literature.
To validate the categorization of phases, their coverage by the studied articles was evaluated. This assessment helped identify the commonly mentioned steps and components that are typically required in the digital transformation process.
The approach outlined above yielded the results presented in section three, which encompasses the various categories of phases associated with the digital transformation process.

5. Conclusion

This paper provides an analysis of the findings obtained from the literature review conducted. The results, reveal several essential phases that are integral to the digital transformation process. These phases include:
Evaluation of digital transformation: This phase primarily focuses on assessing the current digital state of a specific company. It is crucial to conduct a comprehensive evaluation, considering multiple dimensions, as emphasized by various studies [3, 4]. This evaluation should be carried out at different stages of the digital transformation journey to reflect on the company's digital maturity and assess the effectiveness of the adopted processes. It serves to create awareness among stakeholders regarding the necessity of an engaged and agile approach to digital transformation. [5]
Defining the strategic orientation of digital transformation: This phase involves establishing the strategic direction of the company's digital transformation and setting clear goals. The suggested categories for defining the strategic orientation varied in terms of specificity, requiring some categories to be merged while others were split. This phase encompasses defining the overall strategy for the transformation, including goal setting, conducting internal and external assessments, and formulating objectives and action plans. It is important to consider variables such as company size and industry, as they can influence the approach taken. It is worth noting that this phase significantly impacts the successful execution of the subsequent stages.
Implementing digital transformation: This phase involves the practical execution of the digital transformation initiatives on the ground. It is essential

to adequately prepare and guide the implementation process. Implementation represents the most tangible and concrete phase of the entire transformation project. These identified phases highlight key aspects that are crucial for a successful digital transformation journey.

The impact of digital transformation will be experienced and observed by various stakeholders. The speed at which this change materializes depends on the motivation and commitment of these stakeholders towards the collective goal of digitalization. It is important to note that the reviewed material strongly advocates for having a strategic vision and emphasizes the integration of technology as a step in implementing digital transformation. This indicates a clear distinction between ICT integration and digital transformation, contrary to common misconceptions that often merge the two concepts [4].

The reviewed articles, however, do not extensively cover other phases of the digital transformation process, which reflects the diverse perspectives on this topic. While this diversity enriches the discussion and provides multiple choices for the transformation process, it can also create confusion due to the wide range of possibilities, without necessarily considering the multidimensional nature of digital transformation.

Furthermore, the literature review reveals that representation models are commonly used in digital transformation roadmaps. While these representations are concise and condensed, they often lack the level of detail required (such as input-activity-output) to adapt the suggested processes to the specific reality and context of companies.

This analysis underscores the need for a concerted effort and thoughtful consideration of the digital transformation process. Guidelines should encompass the various dimensions and stakeholders involved in digital transformation, striking a balance between providing generic phases while allowing for flexibility to accommodate different companies. This task is crucial but challenging, particularly when considering the diverse variables associated with companies, such as size, industry, target audience etc.

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Artificial Intelligence in Risk Banking: Enhancing Risk Management and Decision-Making Processes

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Abstract
The article analyzes how artificial intelligence (AI) is used in risk banking and how it might improve risk management and decision-making. The exponential expansion of data and the complexity of financial systems have posed serious problems for conventional risk management strategies. By enabling banks to examine massive amounts of data, spot trends, and make precise predictions, AI, with its sophisticated algorithms and machine learning approaches, provides intriguing solutions. Detecting fraud, evaluating credit risk, adhering to regulations, preventing money laundering, stress testing, customer risk profiling, assisting traders and investors with decision-making, and maintaining cybersecurity are just a few of the important areas where AI is transforming risk management in banking. Furthermore, it emphasizes the importance of responsible AI implementation, including governance, transparency, and ethical considerations, to ensure the effective and sustainable use of AI in the banking industry.

Key words :

Overview of Risk Banking

Risk banking, often referred to as risk-based banking or risk-sensitive banking, is a banking strategy that places a strong emphasis on identifying and controlling the risks involved in a variety of financial activities. It entails assessing potential risks connected to lending, investing, and other financial activities and taking such risks into account when making decisions.

To maintain the stability and soundness of their business operations, banks that practice risk management take a proactive approach to identifying, measuring, monitoring, and controlling risks. Banks can allocate resources more effectively and decide on pricing, capital allocation, and risk mitigation methods by taking the risk profile of each transaction and customer into account.

Risk assessment is a crucial component of risk banking. To evaluate the credit risk, market risk, operational risk, and liquidity risk related to their operations,

banks use a variety of approaches and models. These evaluations assist banks in calculating the likelihood of default, prospective losses, and the sufficiency of capital reserves.
Banks provide risk ratings to their customers and transactions based on the risk assessment. Banks can distinguish between low-risk and high-risk activities using this rating system and allocate resources accordingly. It also aids in establishing the proper loan and other banking product prices.
The significance of risk management is also emphasized by risk banking. Banks provide frameworks and policies for risk management that specify the steps to take for risk identification, measurement, monitoring, and control. To effectively manage and mitigate risks, they utilize internal controls, risk mitigation plans, and stress testing.
Regulatory entities are essential to risk banking. They establish policies and rules that control how banks handle risk. These rules guarantee that banks keep enough capital reserves, form risk management panels, carry out regular risk assessments, and adhere to reporting specifications.

Risk banking offers numerous advantages. Banks can lessen the possibility of financial losses, increase their risk-adjusted returns, and boost their overall financial performance by incorporating risk factors into decision-making. Additionally, it supports banking industry stability and protects stakeholders' and depositors' interests.

Introduction to AI and its potential in risk banking
In the world of risk banking, artificial intelligence (AI) has become a disruptive force that has completely changed how financial organizations detect, evaluate, and manage risks. Artificial intelligence (AI) has the ability to improve risk management procedures, boost efficiency, and promote more precise decision-making in the banking industry by utilizing cutting-edge algorithms, machine learning, and big data analytics. In order to find patterns, spot anomalies, and foresee potential hazards, AI can evaluate enormous volumes of structured and unstructured data, including financial transactions, market trends, customer behavior, and external influences. This enables banks to establish more effective risk mitigation measures, improve their risk assessment models, and proactively address emerging concerns.
Additionally, chatbots and virtual assistants powered by AI can speed banking procedures, respond to queries, and offer tailored customer service, improving the entire customer experience. The use of AI in risk banking presents a number of difficulties, including issues with data privacy and ethical issues, but it also represents a promising new direction for the banking sector given

its potential to transform risk management procedures and strengthen the resilience of financial institutions.

Machine learning techniques and algorithms relevant to risk management

In the subject of risk management, machine learning techniques and algorithms have grown in importance, providing strong tools for analyzing complex data and reaching wise conclusions. One such method is supervised learning, which involves building models from labeled data in order to categorize risks or forecast outcomes based on past trends. Risk managers can accurately determine the possibility and impact of prospective threats using this methodology. Contrarily, unsupervised learning techniques enable the discovery of hidden patterns or abnormalities in data, assisting in the early detection of hazards or fraudulent actions. [1]

Similar risk profiles can be grouped together using clustering techniques like k-means or hierarchical clustering, which can help with asset allocation and portfolio diversification strategies. Algorithms that use reinforcement learning can also improve decision-making by maximizing long-term rewards and learning from feedback. These algorithms can aid financial firms in efficiently allocating resources and optimizing their risk mitigation techniques. Additionally, using natural language processing techniques, it is possible to analyze unstructured data sources like news articles and social media to determine market sentiment and estimate potential hazards. Overall, machine learning techniques and algorithms give risk managers strong tools to pinpoint, evaluate, and take proactive steps to mitigate risks, which contributes to the stability and resilience of financial institutions overall.

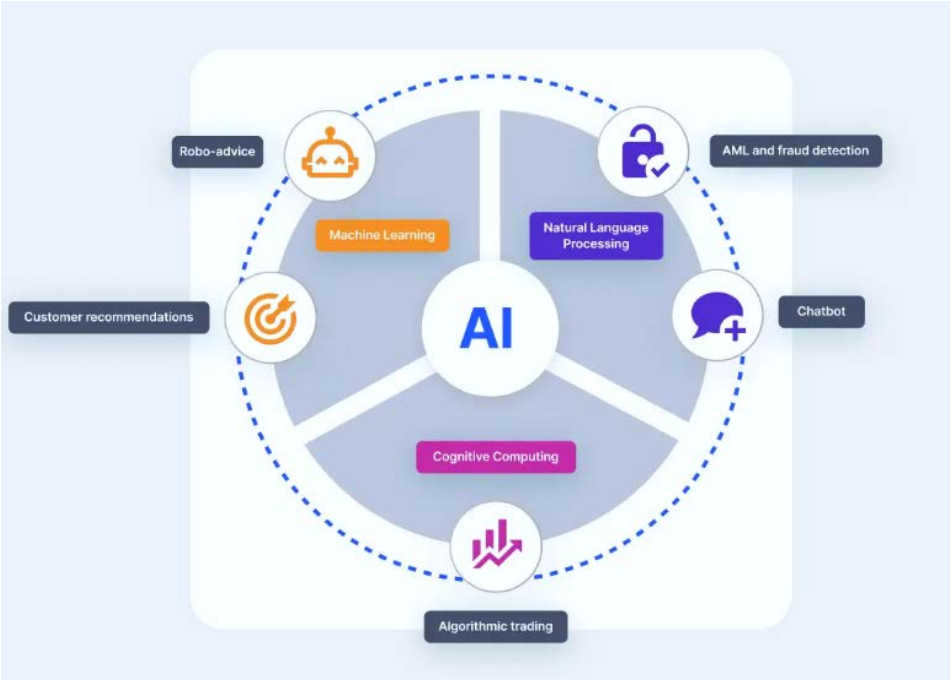
Applications of AI in Risk Banking

- **Fraud Detection**

In the area of risk management, fraud detection is a crucial use of machine learning. Traditional rule-based systems frequently fail to successfully detect and deter fraudulent behavior due to the ever-increasing complexity and sophistication of fraudulent actions. On the other side, fraud detection using machine learning approaches is more sophisticated and adaptive.[2]

The use of AI algorithms to spot fraudulent activity has developed into a potent risk management strategy. Big data analytics and machine learning techniques are used by AI systems to evaluate enormous volumes of data and spot trends indicating fraudulent behavior. The following are some applications of AI algorithms in fraud detection:

1. *Anomaly Detection:* AI algorithms can detect anomalies in transactional data by comparing new transactions against historical patterns. Unusual patterns, such as sudden high-value transactions or transactions outside a customer's typical behavior, can be flagged for further investigation as potential fraud.
2. *Predictive Modeling:* AI algorithms can build predictive models that learn from historical fraud cases and identify common features or indicators associated with fraudulent activities. These models can then be used to assess new transactions in real-time and assign a risk score, allowing for swift action to be taken when suspicious behavior is detected.
3. *Network Analysis:* AI algorithms can analyze networks of interconnected entities, such as customers, merchants, or accounts, to uncover complex fraud networks. By identifying relationships and dependencies, AI algorithms can highlight suspicious connections and help in identifying fraudulent activities involving multiple entities.
4. *Natural Language Processing (NLP):* NLP techniques enable AI algorithms to analyze unstructured data sources, such as emails, chat logs, or social media, to uncover potential indicators of fraud. Sentiment analysis can identify suspicious conversations or communications related to fraudulent activities. **Figure 1**



5. *Behavior Analysis:* AI algorithms can analyze customer behavior patterns over time to establish normal behavior profiles. Any deviation from these profiles, such as sudden changes in spending patterns or geographic locations, can be indicative of fraud and trigger alerts for investigation.
6. *Real-Time Monitoring:* AI algorithms can continuously monitor transactions and detect fraudulent activities in real-time. This proactive approach allows for immediate action to be taken to prevent further losses and mitigate risks.

Applications of Artificial Intelligence in banking

A key component of risk management in the financial sector is the monitoring and prevention of fraud in real-time. Organizations must take proactive steps to identify and stop fraud as it happens because fraudulent actions are becoming more sophisticated. Key elements of real-time fraud monitoring and prevention include the following:

1. *Transaction Monitoring:* Real-time transaction monitoring involves continuously analyzing incoming transactions in real-time to identify potential fraudulent activities. Advanced AI algorithms and machine learning models are employed to analyze transactional data and detect anomalies or suspicious patterns that indicate fraudulent behavior. By monitoring transactions as they occur, financial institutions can swiftly intervene and prevent fraudulent transactions from being processed. [3]
2. *Risk Scoring:* Real-time risk scoring assigns a risk level to each transaction based on various factors such as transaction amount, customer history, location, and behavior. Machine learning models analyze these factors and generate risk scores in real-time, allowing organizations to prioritize and focus their attention on high-risk transactions that require immediate investigation. This helps in minimizing the response time to potential fraud instances.
3. *Rules-Based Alerts:* Real-time fraud monitoring systems can be configured with rules and thresholds to trigger alerts when specific conditions are met. For example, if a transaction exceeds a certain threshold or matches predefined fraud patterns, an alert can be generated for further investigation. Rules can be customized and updated based on emerging fraud trends to enhance detection accuracy.
4. *Machine Learning Models:* Employing machine learning models, such as supervised and unsupervised learning algorithms, enhances real-time fraud prevention capabilities. These models can continuously learn from

new data, adapt to evolving fraud patterns, and improve detection accuracy over time. By leveraging historical data and training these models on a large scale, financial institutions can stay ahead of fraudsters and detect emerging fraud techniques.

5. *Network Analysis:* Real-time fraud prevention involves analyzing the network of interconnected entities, such as customers, accounts, and merchants, to detect suspicious relationships or connections. By identifying patterns of collusion or fraudulent networks, financial institutions can take immediate action to prevent fraudulent activities involving multiple parties.
6. *Integration of Data Sources:* Real-time fraud prevention systems integrate diverse data sources, including transactional data, customer information, external data feeds, and public databases. By consolidating and analyzing these data sources in real-time, organizations gain a holistic view of potential risks and can make more informed decisions in preventing and combating fraud.

- **Credit Risk Assessment**

In the banking and lending sector, assessing credit risk involves determining whether or not potential or actual borrowers are creditworthy. It seeks to estimate the likelihood of loan default or credit facility non-payment. In order for financial organizations to manage their entire portfolio risk and make wise lending decisions, credit risk assessment is essential. The evaluation takes into account a number of variables, including the borrower's credit history, income, debt obligations, and collateral. Credit risk assessment has always relied on manual analysis and arbitrary judgments. However, as technology and data analytics have developed, AI algorithms and machine learning models have emerged as useful tools for improving the precision and effectiveness of credit risk assessment. These models can analyze enormous amounts of data, spot patterns, and produce predictive models to evaluate borrowers' creditworthiness. Financial institutions can improve the reliability of their credit risk assessments, streamline their lending procedures, and make well-informed judgments that strike a balance between risk and profitability by utilizing historical data, alternative data sources, and advanced analytics approaches. Effective credit risk assessment helps financial institutions to access loans for deserving people and businesses, promoting economic growth and stability while also safeguarding them from potential losses.

AI models for accurate credit risk assessment

AI models have revolutionized credit risk assessment by offering more accurate and sophisticated analysis. To assess large amounts of structured and

unstructured data, including bank records, transaction history, credit reports, economic indicators, and even social media data, these models make use of machine learning algorithms and advanced data analytics. Credit risk assessments using AI models that have been trained on previous credit data are more accurate because these models are able to spot patterns and correlations that humans might miss.

Supervised learning algorithms, such as logistic regression, random forests, or gradient boosting, can be trained on labeled data to predict creditworthiness. These models learn from past credit applications and repayment behavior to evaluate the likelihood of default. By considering a wide range of variables and their interactions, AI models can uncover complex relationships and provide a more comprehensive assessment of credit risk.

Additionally, AI models can incorporate alternative data sources that may not be traditionally used in credit assessments. For example, analysis of transactional data or digital footprints can provide insights into a borrower's financial behavior and stability. Natural language processing techniques can extract relevant information from unstructured data sources, such as loan applications or customer reviews, enhancing the accuracy of risk assessment.

Furthermore, AI models can continuously learn and adapt to changing market dynamics and evolving patterns of credit risk. By regularly updating the models with new data, financial institutions can improve their risk assessment models and adapt to emerging trends or economic shifts.

Overall, AI models offer the potential to enhance credit risk assessment by providing more accurate, data-driven insights. By leveraging advanced analytics and machine learning algorithms, financial institutions can make better-informed decisions, mitigate risks, and maintain a healthy credit portfolio while ensuring fair access to credit for borrowers.

- **Automating AML compliance processes using AI**

Artificial intelligence (AI) automation of Anti-Money Laundering (AML) compliance procedures has become a key development in the finance sector. Identification and prevention of activities involved in money laundering, terrorist funding, and other illegal financial transactions are part of AML compliance. How AI can automate AML compliance procedures is shown here[4].

1. *Entity screening:* AI is capable of automating the process of checking clients, counterparties, and other organizations against a variety of watchlists, such as sanctions databases or databases of politically exposed individuals (PEPs). In order to identify potential dangers connected with entities, natural language processing algorithms can read and evaluate unstructured data sources like news stories or regulatory

pronouncements. By automating entity screening, it becomes more accurate and effective while reducing the possibility of missing high-risk individuals or entities.

2. *Risk Scoring and Prioritization:* Using a variety of data points, including as past behavior, transaction patterns, and other risk indicators, AI models may rate the risk of customers or transactions. These risk scores assist in focusing on high-risk cases and prioritizing resource allocation to ensure effective compliance efforts. By continuously learning from fresh data, machine learning algorithms can modify risk rating models to account for shifting trends and new dangers. [5]
3. *Suspicious Activity Detection:* AI algorithms can identify patterns and relationships within transactional data, uncovering potentially suspicious activity networks. By analyzing complex data sets and connections between entities, AI can identify hidden links, detect layering techniques, or identify potential money laundering schemes that may evade manual detection. This automated process enables timely intervention and investigation into suspicious activities.
4. *Regulatory Reporting:* AI can automate the creation of the paperwork and reports needed to ensure AML compliance. AI improves the reporting process, minimizing human error and assuring compliance with regulatory standards by extracting pertinent information from transactional data and generating report templates.
5. *Continuous Monitoring and Learning:* AI models can continuously monitor and analyze new data to adapt to evolving money laundering techniques and emerging risks. By staying updated with the latest trends and regulatory changes, AI-powered systems can enhance AML compliance measures and proactively identify new risks. [6]

Potential advancements and future applications of AI in risk banking

The potential advancements and future applications of AI in risk banking are set to transform the industry in significant ways. AI holds the promise of advancing risk management practices, improving decision-making, and strengthening the overall resilience of financial institutions. With continued advancements in AI technology, we can expect to see enhanced risk modeling techniques, enabling more accurate assessments of credit risk, market risk, and operational risk. Real-time risk monitoring will become more sophisticated, leveraging AI algorithms to analyze vast volumes of data and provide immediate alerts for emerging risks. Fraud detection and prevention will be fortified, with AI algorithms identifying complex patterns and anomalies to proactively combat fraudulent activities. AI will play a key role

in ensuring regulatory compliance by automating the analysis of data and streamlining reporting processes. [7]Moreover, AI-powered cybersecurity measures will bolster defenses against cyber threats and data breaches. Customer experience will be enriched through personalized recommendations and AI-powered virtual assistants. Additionally, the implementation of robotic process automation (RPA) in conjunction with AI will automate routine tasks, enhancing operational efficiency. As AI technology progresses and more data becomes available, the future of AI in risk banking holds immense potential for driving innovation and resilience across the financial industry. [8]

Conclusions

In conclusion, the integration of Artificial Intelligence (AI) in risk banking is revolutionizing the way financial institutions manage risks and make informed decisions. AI algorithms and machine learning techniques offer powerful tools for analyzing vast amounts of data, identifying patterns, and detecting anomalies that may indicate potential risks or fraudulent activities. By leveraging AI, risk banking processes such as credit risk assessment, fraud detection, and regulatory compliance can be automated, leading to enhanced accuracy, efficiency, and proactive risk mitigation. AI's ability to continuously learn and adapt to changing market dynamics enables financial institutions to stay ahead of emerging risks. Moreover, AI-driven advancements in risk modeling, real-time risk monitoring, and customer experience personalization hold significant promise for the future of risk banking. As financial institutions harness the potential of AI, they can strengthen their risk management frameworks, minimize losses, ensure regulatory compliance, and provide better services to customers. However, it is crucial to strike a balance between the capabilities of AI and the ethical considerations associated with data privacy, transparency, and fairness. With responsible implementation and ongoing development, AI is poised to play a vital role in enhancing risk management and decision-making processes in the dynamic and ever-evolving landscape of risk banking.

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Future Trends and Emerging Technologies in ITIL for SMEs

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Abstract
For managing IT services in businesses of all sizes, the Information Technology Infrastructure Library (ITIL) has long been acknowledged as a framework. Small and medium-sized businesses (SMEs) are increasingly embracing ITIL techniques to improve their IT service management capabilities, despite ITIL being typically associated with larger businesses. The research examines the rising ITIL trends and technologies that are especially suited for SMEs. It highlights crucial areas where SMEs may use ITIL to boost service delivery, productivity, and competitiveness. The potential impacts of modern technological advances on the adoption of ITIL in SMEs are discussed in the study, including artificial intelligence, automation, and cloud computing. It also looks at the difficulties SMEs have implementing ITIL practices and offers suggestions for successful implementation. The knowledge shared in this article is intended to help SMEs use ITIL and innovative technologies to address evolving IT service management requirements.
Keywords: ITIL, SMEs, optimization, AI, IT service

Small and medium-sized businesses (SMEs) face particular difficulties in staying competitive and providing their clients with effective services in today's fast-paced digital environment. It becomes clear that the Information Technology Infrastructure Library (ITIL) is an effective framework for addressing these issues and maximizing the commercial potential of SMEs. ITIL enables SMEs to optimize their IT processes, increase customer satisfaction, and achieve sustainable growth by coordinating IT services with business goals. This introduction covers the value of ITIL for SMEs and how implementing it might completely transform their business processes. The generation of jobs, innovation, and economic growth are all supported by SMEs, which form the backbone of the world economy. But small businesses frequently struggle with scarce resources, operational inefficiencies, and weak IT systems.[1], [2] Recognizing these issues, ITIL gives SMEs an organized and scalable method for managing their IT services, allowing them to streamline operations and gain an advantage over rivals. ITIL gives SMEs the tools they

need to improve continuously by empowering them to optimize their IT processes, reduce downtime, and limit interruptions.

Benefits of ITIL Adoption for SMEs

Its focus on the customer is one of ITIL's major benefits for SMEs. Delivering outstanding client experiences is essential for corporate success in an increasingly service-driven market. Through ITIL, SMEs can improve service quality, responsiveness, and reliability by emphasizing the alignment of IT services with customer needs and expectations. By using ITIL practices, SMEs can enhance the processes for incident management, problem solving, and service requests, which will lead to less downtime, quicker response times, and more customer satisfaction. As a result, there is increased client retention and market differentiation. [3]

The advantages of adopting ITIL for SMEs are based on understanding of the sector and the experiences of businesses that have done so. The IT service management community has generally acknowledged and highlighted several advantages, including:

1. *Improved Service Delivery*: By offering a structured framework for service management, ITIL adoption helps SMEs in improving the delivery of their IT services. SMEs may create explicit service definitions, standardize service levels, and enhance incident, problem, and change management by applying ITIL processes and practices. As a result, there is a rise in service effectiveness, a decline in downtime, and an improvement in customer satisfaction.
2. *Improved Customer Satisfaction:* SMEs may match their IT services to client needs and requirements through ITIL's customer-centric approach. SMEs can raise customer satisfaction levels by emphasizing service quality, responsiveness, and addressing customer needs. Customers who are happy with the SME are more likely to recommend it to others, stay loyal, and help it succeed in the long run.
3. *Increased Operational Efficiency:* SMEs can improve their IT processes and workflows by following the recommendations provided by ITIL. SMEs can enhance productivity, streamline processes, and remove of duplication by implementing ITIL practices. As a result, operating expenses are decreased, resource utilization is enhanced, and employee productivity is increased.
4. *Better Decision-Making:* The ITIL's emphasis on data-driven decision-making and performance monitoring helps SMEs make intelligent business decisions. SMEs can gain useful insights into their IT operations,

pinpoint areas for improvement, and connect their IT strategy with business objectives by applying ITIL's service reporting and monitoring methods.

5. *Better Risk Management*: SMEs may manage risks more successfully thanks to ITIL's protocols and practices. SMEs can identify and mitigate risks proactively, reducing the impact of prospective incidents on their business operations, by applying ITIL's change management, problem management, and incident management techniques.
6. *Cost Optimization:* The ITIL standard's emphasis on cost-effective service management enables SMEs to make the most of their IT investments and cut back on operating costs. SMEs may better their budgeting and forecasting, ensure that resources are distributed effectively, and align IT expenditures with business objectives by implementing ITIL's financial management practices.
7. *Scalability and Flexibility*: Because ITIL is flexible, SMEs can modify their IT services to meet expanding and altering business needs. By putting ITIL concepts into effect, SMEs may create an adaptable IT infrastructure that can grow or shrink as needed, facilitating business expansion and allowing the organization to adapt to changing market needs.

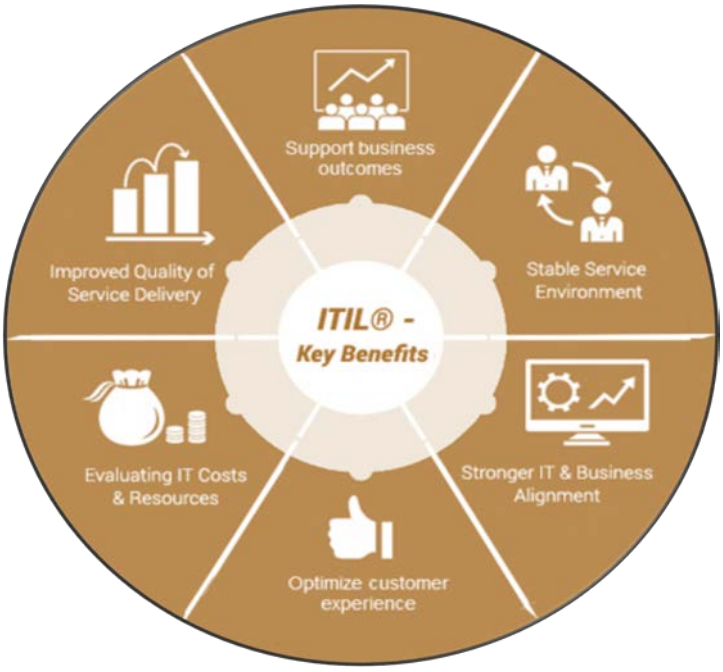

Figure 1 Benefits of ITIL

Future Trends in ITIL for SMEs

Small and medium-sized businesses (SMEs) are struggling with the requirement to adapt and use the most recent developments to stay competitive in the market as technology continues to improve at an extraordinary rate. The Information Technology Infrastructure Library (ITIL) has become a well-known framework for managing technology and providing effective IT services. A set of best practices and recommendations called ITIL are provided for managing IT services, with a focus on things like service design, transition, operation, and improvement. [4] Due to its vast scope and resource needs, ITIL has historically been predominantly associated with large companies. But as the digital environment changes, so does the way ITIL is used, giving SMEs new opportunities and predicting future trends.

In this part will focus on approaching ITIL trends that are specifically geared for SMEs, emphasizing significant advancements that will impact these companies handle IT service management, briefly analyzing some of the most important practices:

- **ITIL and cloud computing**: The adoption of cloud computing has changed the IT environment, providing SMEs with scalable infrastructure and affordable solutions. ITIL and cloud-based services complement one other, allowing SMEs to take use of cloud computing while preserving efficient service management procedures.
- **Integration of Agile and DevOps**: Agile techniques and DevOps practices have become quite popular, allowing for quicker software development and deployment cycles. Those hepls how SMEs can enhance collaboration and efficiency within their IT teams by integrating these agile and DevOps ideas with ITIL procedures.
- **Service management powered by automation and AI**: As automation and artificial intelligence (AI) develop, they provide previously unheard-of prospects for streamlining IT service management procedures, intend to talk about how SMEs may use automation and AI-driven solutions to improve service delivery, shorten response times to incidents, and maximize resource allocation.
- **Service Integration and Management, or SIAM**: For their IT needs, SMEs frequently collaborate with a variety of suppliers and service providers (Service Integration and Management, or SIAM). As a framework to manage these extensive multi-vendor setups successfully, Service Integration and Management (SIAM) is rising in popularity. In order to achieve smooth service integration and coordination SMEs can apply SIAM principles within their ITIL framework.

- **Security and Compliance**: Due to the presence of data privacy laws and cyber risks, SMEs must give security and compliance top priority, ITIL may help SMEs build solid security and compliance frameworks that guarantee the safety of sensitive data and compliance with laws.

Emerging Technologies in ITIL for SMEs

It is impossible to overstate the impact of emerging technologies on IT service management on small and medium-sized businesses (SMEs). Several cutting-edge technologies are changing the landscape in the context of ITIL (Information Technology Infrastructure Library), empowering SMEs to improve their efficiency, agility, and overall service delivery.

Cloud computing is one of the well-known new technologies in ITIL for SMEs. With the help of cloud-based solutions, SMEs can access IT resources and services as needed without having to make significant infrastructure investments. SMEs may quickly scale their operations, launch apps more quickly, and increase the availability of their services as a whole by utilizing cloud services. Additionally, pay-as-you-go models can be used by SMEs thanks to cloud computing, which lowers up-front expenses and gives resource allocation flexibility. [5]

Artificial intelligence (AI) is another new technology that has made great progress in ITIL for SMEs. Different ITIL operations, including incident management, problem management, and change management, can be automated by AI-powered solutions. By deploying AI-driven chatbots, SMEs can offer 24/7 customer service, effectively handle routine problems, and free up their IT team to work on more difficult projects. AI systems can also analyze enormous volumes of data to find trends, foresee potential problems, and improve service delivery.

Another technology that is revolutionizing ITIL for SMEs is the Internet of Things (IoT). SMEs can now monitor their IT infrastructure, machinery, and facilities in real-time thanks to the proliferation of IoT devices. Through proactive management, the detection of potential bottlenecks, and forecasting of repair needs, this continuous monitoring is possible. IoT may help SMEs by lowering downtime, increasing service availability, and streamlining incident and problem management procedures. [6]

ITIL for SMEs is also noticing the impact of blockchain technology. ITIL procedures are more secure and reliable because to blockchain's decentralized and immutable structure. It can be used to implement secure identity management, ensure data integrity, and provide transparent and auditable service transactions. Blockchain can be used by SMEs to improve service

management procedures, lower the risk of fraud, and boost consumer confidence.

SMEs now have more opportunities than ever to improve their service management procedures thanks to growing ITIL technologies. In today's quickly changing business environment, revolutionary technologies like cloud computing, AI, the Internet of Things, and blockchain can help SMEs provide better services, increase operational efficiency, and gain a competitive edge. SME success in the digital age can be facilitated by embracing these technologies.

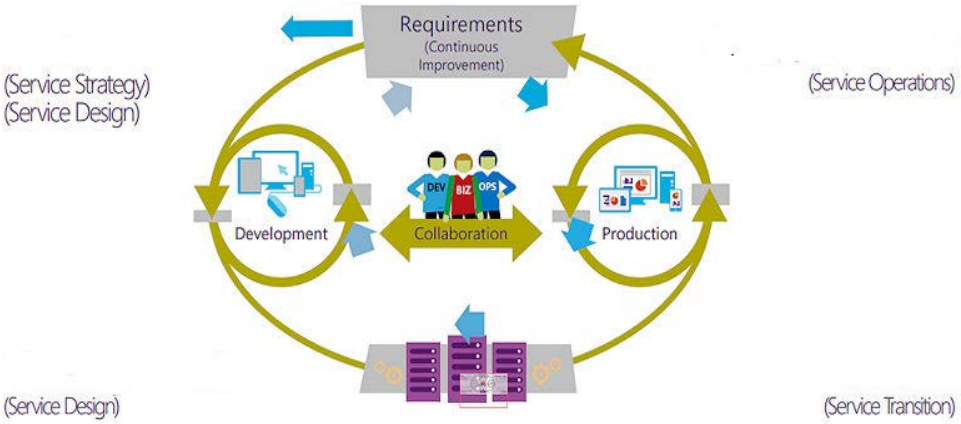

Figure 2 Emerging Technologies in ITIL for SMEs

Challenges in Adopting ITIL for SMEs

Small and medium-sized businesses (SMEs) can gain a lot from adopting ITIL (Information Technology Infrastructure Library) standards, including greater service quality, increased efficiency, and better alignment of IT services with business goals. When attempting to apply ITIL frameworks, SMEs frequently run across a number of difficulties. Resource scarcity, organizational complexity, and change resistance are only a few causes of these difficulties. For SMEs to effectively utilize ITIL's potential and achieve sustainable growth, it is essential that these challenges be overcome.

Resource limitations are one of the main challenges SMEs have in adopting ITIL. Contrary to bigger firms, SMEs may have a limited amount of resources to devote to establishing and maintaining ITIL principles, including infrastructure, staff, and budgets. The adoption process might be hampered by the lack of resources because it calls for spending money on tools, training,

and devoted employees. To overcome these obstacles, SMEs must come up with creative ways to maximize their resource usage and give ITIL implementation tasks top priority. [7]

The complexity of organizational structure and operations within SMEs is a substantial additional barrier. It is difficult to define and standardized ITIL processes across the business because SMEs frequently operate with flexible and dynamic workflows, in contrast to more streamlined and hierarchical systems. For SMEs looking to adopt ITIL frameworks, aligning diverse departments, managing dependencies, and maintaining effective communication become key challenges. To handle these complications and create a unified ITIL implementation strategy, clear communication and active participation from all stakeholders are crucial.

Another challenge SMEs encounter when applying ITIL techniques is resistance to change. Employees may be used to current procedures and reject changes brought about by the adoption of ITIL. [8] Effective change management techniques, such as extensive communication, training programs, and developing a culture that emphasizes continual improvement, are required to overcome this reluctance. To inspire staff and promote their active engagement in the adoption process, SMEs must emphasize the advantages of ITIL, such as increased productivity, increased customer satisfaction, and the possibility for long-term growth. [9] Additionally, the teams of SMEs frequently lack dedicated ITIL expertise. The organization may not always have the specialized expertise and skills necessary for ITIL implementation on hand. To close this knowledge gap, SMEs may need to engage in outside consultants, training courses, or collaboration agreements with IT service providers. For IT service management techniques to be adopted and improved continuously, it is essential for the organization to develop a strong ITIL expertise.

In conclusion, even though SMEs can greatly benefit from adopting ITIL, there are still a number of obstacles to overcome. The implementation process may encounter challenges due to resource limitations, organizational complexity, opposition to change, and a lack of ITIL competence. However, SMEs can build a strong basis for effective ITIL implementation by proactively addressing these issues. SMEs may overcome these obstacles and fully utilize ITIL to boost their company growth and competitiveness in the digital world with careful planning, good communication, and a focus on continuous improvement.

Recommendations for Successful ITIL Implementation in SMEs

Implementing ITIL (Information Technology Infrastructure Library) frameworks in small and medium-sized enterprises (SMEs) requires careful planning, effective execution, and a focus on continuous improvement. While SMEs may face unique challenges during the implementation process, there are several recommendations that can help ensure successful adoption and reap the benefits of ITIL practices.

1. **Define Specific Goals**: SMEs should specify their goals and intended outcomes before beginning the ITIL implementation process. This entails pinpointing the precise areas of IT service management that require development and coordinating them with the organization's overarching business objectives. There are various guidelines that can help ensure successful adoption and enjoy the benefits of ITIL principles during the implementation process. By setting defined objectives, SMEs can create a roadmap for their ITIL implementation and assess their progress efficiently. [10]
2. **Start with a Small-Scale Approach**: For SMEs, fully implementing ITIL might be difficult. It is advised to start small in order to reduce risks and guarantee a smooth transition. SMEs can choose one or two ITIL procedures that perfectly suit their current requirements and then gradually broaden the implementation's scope. This staged strategy enables concentrated efforts, better resource management, and elevated success rates. [11]
3. **Obtain Top Management backing**: The deployment of ITIL requires the backing of top management. Executives should be aware of the advantages of ITIL and actively express their support for the project. The resources they support can be obtained, the company culture can be changed, and employee engagement may be increased. Executives must be regularly updated on the status of projects in order to handle any issues or obstacles. [12]
4. **Invest in Training and Development**: A sustainable implementation requires the development of ITIL competences across the enterprise. SMEs should spend money on training and development initiatives to make sure that staff members have the skills and knowledge required to implement and maintain ITIL processes. This may entail offering ITIL certification classes, setting up internal workshops, or using outside consultants who have experience with ITIL.
5. **Continuously Assess and Improve**: SME adoption of ITIL best practices should be continuously monitored and evaluated as it is an ongoing process. It is possible to find opportunities for improvement and enhance ITIL processes by routinely analyzing key performance indicators (KPIs)

and getting input from stakeholders. SMEs should adopt a culture of continuous improvement and actively look for chances to improve their methods for managing their IT services.

6. **Utilize Technology**: The use of technology is essential to the implementation of ITIL. SMEs should use IT service management techniques and technologies that match their needs and financial constraints. These tools can streamline procedures, increase effectiveness, and give current information on how well a service is performing. Technology solutions that interact effectively with current systems and are scalable to allow future development must be carefully considered and chosen. [13]

Strategic planning, executive support, cooperation, training, and continual improvement are necessary for a successful ITIL implementation in SMEs. By adhering to these suggestions, SMEs may get over obstacles, improve their IT service management procedures, and maximize the power of ITIL to boost customer satisfaction and promote corporate success.

Conclusions

In conclusion, small and medium-sized enterprises (SMEs) face both exciting prospects and challenging situations as a result of future trends and emerging technologies in ITIL (Information Technology Infrastructure Library). In order to stay competitive and adaptable in their business operations, SMEs must keep up with the rapid technological advancements.

First off, the emergence of cloud computing has had a big impact on SME ITIL practices. SMEs have scalable, affordable options for managing their IT infrastructure using cloud-based solutions. SMEs can access cutting-edge IT capabilities by utilizing cloud services without having to make significant hardware investments. As a result, SMEs should think about implementing cloud-based ITIL solutions to increase their operational effectiveness.

Second, the growing focus on data analytics and artificial intelligence (AI) offers SMEs opportunity to use insights from their enormous amounts of data. SMEs can optimize processes, evaluate customer behavior, and make data-driven decisions thanks to AI-powered technologies. SMEs may automate and optimize operations, lower human error, and boost productivity overall by implementing AI technology within the ITIL framework. Furthermore, it is impossible to ignore the growing significance of cybersecurity. SMEs are more vulnerable to cyber threats as a result of their increased reliance on digital technologies. SMEs must give cybersecurity measures top priority and include them into their ITIL procedures. For SMEs to safeguard their priceless assets

and keep customers' trust, strong security frameworks, frequent vulnerability assessments, and establishing a culture of cybersecurity awareness are essential.

In order to succeed in the shifting digital environment, SMEs must embrace future trends and cutting-edge technology in ITIL. SMEs may improve their operational efficiency, offer innovative services, and acquire a competitive edge by utilizing cloud computing, AI, IoT, cybersecurity measures, and DevOps techniques. To ensure their continued success in the future, SMEs must be proactive, keep learning, and adapt their ITIL practices to the changing technology

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Corporate Social Responsibility and Diversity Management

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Abstract

Diversity is one of the challenges and indicators of the corporate social responsibility which provides equal opportunities for employment regardless of gender, race, ethnicity or other immutable characteristics of the individual. The issues highlighted by this article are the implementation of corporate policies in the management of diversity and the creation of a managerial and employee network. To understand what objectively relevant results produce the connection between the management of diversity and social responsibility, the research focused on analysis of the German case of the book "Corporate Social Responsibility and Management of Diversity - Theoretical Approaches and Best Practices".

In addition, this article explains how the German corporations implement the diversity management strategies which are ranked at the top of world rankings in terms of encouraging corporations to develop sustainable diversity management policies. At the end, the research is enclosed with the analysis of the case of Henkel company on the implementation of diversity management strategies, a successful practice of diversity management strategies with the purpose to reflect on the advantages that the spread of such good practice can produce for the benefit of all corporations.

Keywords: Corporate Social Responsibility, Diversity Management, German Corporations, Henkel Company, Good Practice.

1. Introduction.

Diversity represents one of the challenges and indicators of the corporate social responsibility. In the context of corporate social responsibility, diversity is defined as a challenge to corporations in providing equal opportunities for employment regardless of gender, race, ethnicity or other immutable characteristics of the individual. Despite these characteristics, it is important to pay attention to the analysis of the implementation of corporate policies in the management of diversity and the creation of a managerial and employee network, which is the subject of this article. In the analysis of this topic, we focus on the attitude of the authors

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disclosed in the book *"Corporate Social Responsibility and Management of Diversity - Theoretical Approaches and Best Practices"*.

What the authors intend to point out through the ideas reflected in the book consists in clarifying the connection with corporate social responsibility and management of diversity. Increasing the awareness of the society and public sensitivity regarding issues related to gender equality and equal treatment in work environments led corporations to engage more in the issue of managing the diversity of different groups. The book "*Corporate Social Responsibility and Management of Diversity - Theoretical Approaches and Best Practices*" addresses the topic of diversity management by examining best practices and strategies to create the most positive impact on society to manage diversity in the workplace. Among the main researches of this article is the link between sustainable development within the corporate social responsibility and management of diversity.

In relation to diversity management, the analysis focuses on examining cases of how corporations try to create benefits by leveraging the different experiences and viewpoints of different human resources. Moreover, the diversity management aims not only at creating competitive advantages for the corporation, but also at creating benefits for the community, other organizations and stakeholders that interact with them. In general, in the management of diversity, the corporations engage in the design of strategies that treat diversity as an added asset for the corporation that would help in increasing value and not as a challenge or difficulty in achieving objectives.

The main purpose of this article consists in the analysis of cases of good practices on diversity management, focusing on the policies drawn up with a focus on staff recruitment with the aim of guaranteeing diversity, as well as training and awareness of employees in order to interact better in an environment with different elements.

2. Is there a link between the management of diversity and social responsibility?

The diversity management does not consist only in the management of issues related to gender equality by corporations, but takes on a broader and comprehensive meaning in the context of guaranteeing human rights. In order to implement diversity management as part of corporate social responsibility, initially, the authors' analysis focuses on whether there is a link between diversity management and social responsibility.

The origins of diversity management policies date back to the civil protests of American society during the years 1950 and 1960.[22] As a result, global movements served as a driving factor for the design of diversity management strategies within the development of sustainable corporate social responsibility. In addition to the world movements for equal treatment of diverse groups, another important factor that influenced to bring to the attention of corporations the management of diversity is related to the globalization of the markets where corporations operate. *Not too long ago corporations became aware of the fact that language, skills, cultural diversity as well as recognition of similarities and differences are all in the implementation of diversity management and considered as a competitive advantage in the market.*[23] In this aspect, it was understood that diversity management is an indicator of a sustainable corporate social responsibility. *The implementation of diversity management strategies within the corporate social responsibility should be seen as a long process, developed step by step, rather than as a temporary project, given that cultural changes require changes in routine and perspective that affect individual behaviors, norms group and management practices.*[24]

3. The case of Germany on the implementation of diversity management strategies

In the context of understanding the policies of implementing diversity management strategies, one of the main examples referred to by the authors is that of German corporations. Germany is at the top of world rankings in terms of encouraging corporations to develop sustainable diversity management policies, as an indicator of corporate social responsibility, but also a necessary market requirement. German companies are focused on the diversity of cultures, languages and ethnic origins of employees, implementing general diversity management policies and practices through which they have

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[22] Hansen K., Seierstad Ch., (2017), Corporate Social Responsibility and the Management of Diversity, Theoretical Approaches and Best Practices, Part I, *"Corporate Social Responsibility and the Management of Diversity: A case of success? Comments from the Case of Germany?"*, page 76.

[23] Hansen K., Seierstad Ch., (2017), Corporate Social Responsibility and the Management of Diversity, Theoretical Approaches and Best Practices, Part I, *"Corporate Social Responsibility and the Management of Diversity: A case of success? Comments from the Case of Germany?"*, page 78.

[24] Hansen K., Seierstad Ch., (2017), Corporate Social Responsibility and the Management of Diversity, Theoretical Approaches and Best Practices, Part I, *"Corporate Social Responsibility and the Management of Diversity: A case of success? Comments from the Case of Germany?"*, page 81.

opened opportunities for workplaces that promote employment and that mark growth in innovation and productivity. As mentioned, German corporations are generally characterized by a climate of success in managing diversity as part of the policy of taking social responsibilities.

3.1. Best practices on the implementation of diversity management strategies implemented by German corporations

In order to understand the best examples presented by these corporations, the author has focused on the analysis of the best practices implemented by these corporations. For the design of a successful strategy, two main stages of the process have been concluded from the analysis of the case of Germany. The *first stage* in the implementation of strategies consists in setting clear goals to be achieved in relation to each group and which can be fulfilled within the activity carried out by the corporation. Meanwhile, the *second phase* consists of drawing up concrete strategies and plans to achieve the set goals. As it has been established, the design and implementation of diversity management and corporate social responsibility strategies is not an issue that belongs only to the corporation, but also to the interested parties and the community in general.

Taking this fact into consideration, in order to fulfill the above-mentioned stages, the example of the German corporations is given that the latter are engaged in the development of periodic meetings for the collection of data, the processing of which best serves the implementation of diversity management practices to simultaneously satisfy both the corporation's own interests and to meet the demands of interest groups. The implementation of diversity management strategies can be carried out as a management strategy implemented from lower structures to higher structures and from higher structures to lower ones.[25]

An example of the implementation of strategies in the framework of diversity management is that of the software development corporation, SAP AG whose strategy is considered among the most powerful and which determines the concrete percentage of employees who should become part of the corporation and who belong to various groups, including women and people with different ethnic or cultural affiliations. In order to fulfill their goals, companies organize sensitization, information campaigns and various trainings for employee awareness and diversity promotion. In order to further

[25] Hansen K., Seierstad Ch., (2017), Corporate Social Responsibility and the Management of Diversity, Theoretical Approaches and Best Practices, Part I, *"Corporate Social Responsibility and the Management of Diversity*: *A case of success? Comments from the Case of Germany?"*, page 81.

specify the methods of implementing diversity management, the authors focused on identifying some of the main strategies incorporated by German corporations in the field of corporate social responsibility.

Two of the main issues on which the attention of corporations is focused the most is that of gender equality and the equal treatment of individuals regardless of sexual orientation. One of the most powerful companies in Germany is the Volkswagen car manufacturing company. The company develops a program of social responsibility which includes clear policies and concrete actions for gender equality, the rights of different employees and the promotion of diversity in the workplace. As mentioned, the company has adopted policies related to equal pay for those employees who have the same qualification and job position, avoiding discrimination in employee recruitment procedures, creating special structures to report the problems of the most vulnerable, less represented groups.[26] The case of Germany analyzed by the authors proves that the various skills and characteristics of employees have turned corporations into benefits. Such a result has been achieved through the management of human resources in such a way that each employee covers a field that best fits his professional skills, but also specific knowledge and characteristics.

An example of such a strategy is the engagement of employees who have skills in foreign languages, backgrounds and different cultural affiliations, in intercultural and international seminars or activities.[27] In a global market where corporate activity exceeds state borders, the implementation of such strategies for managing diversity and human resources in this way offers corporations one of the main advantages in the global market with elements that can recognize different cultures.

Another model of implementing diversity management strategies that is reflected in the book is that of collecting and analyzing data to specify the needs that each group may have based on this data. Corporations collect data and analyze the general age structure of employees in order to promote health programs for each age group of the structure. Age diversity is another feature

[26] Hansen K., Seierstad Ch., (2017), Corporate Social Responsibility and the Management of Diversity, Theoretical Approaches and Best Practices, Part I, *"Corporate Social Responsibility and the Management of Diversity*: *A case of success? Comments from the Case of Germany?"*, page 82.

[27] Hansen K., Seierstad Ch., (2017), Corporate Social Responsibility and the Management of Diversity, Theoretical Approaches and Best Practices, Part I, *"Corporate Social Responsibility and the Management of Diversity*: *A case of success? Comments from the Case of Germany?"*, page 82.

of diversity, therefore, the specifics that employees of different age groups present are different.

In this regard, the author points out that German corporations have applied special programs aimed at the continuous education and training of employees depending on the age and education of each age group in implementation of specific succession plans.[28] Diversity as a concept is very complex in the context of respecting human rights, another aspect of its management is related to respecting the religious beliefs that may have certain employees. In this regard, corporations are committed to ensure that no employee feels prejudiced, discriminated against or underestimated because of his religious or cultural affiliation.

In addition to equal treatment in the workplace and guaranteeing equal working conditions, the author points out the fact that within the framework of diversity management, corporations have taken the necessary measures to provide employees with special environments to practice rituals of certain belonging to their religious faith even during working hours. An example of the implementation of this strategy is that of the German Bank which has built special environments for believers, such as the "pardon room", to meet the needs of employees who are believers and practice religious rites even during working hours, enabling flexibility in working hours.

3.2. The case of Henkel company on the implementation of diversity management strategies

In researching cases of successful practices of diversity management strategies, the author highlights the case of the Henkel company[29]. This company proves how the good management of diversity and the implementation of sustainable corporate social responsibility affects as the main factor in increasing the motivation and commitment of the employee in the work process. Henkel is presented as a successful example of a company that has understood the importance of valuing the employee and treating him equally and promoting an open environment for the inclusion of all employees.[30] The concrete approach that the authors have developed in the book, in the analysis of the Henkel case, consists in the fact that through the

[28] See the point 7.

[29] Hansen K., Seierstad Ch., (2017), Corporate Social Responsibility and the Management of Diversity, Theoretical Approaches and Best Practices, Part III, *"Adding value through evaluation: Reflections on the Henkel case"*, page 229.

[30] Hansen K., Seierstad Ch., (2017), Corporate Social Responsibility and the Management of Diversity, Theoretical Approaches and Best Practices, Part III, *"Adding value through evaluation: Reflections on the Henkel case"*, page 235.

implementation of good practices for diversity management and corporate social responsibility, the network of Henkel companies has managed to ensure the increase in the value of profitability.

Henkel's diversity management strategy takes place in several ways. In the framework of the implementation of diversity management strategies, Henkel has placed its focus in several main directions. One of the primary issues that has been given importance is related to the management of diversity within the framework of gender equality. The main policies followed are aimed at empowering and supporting both genders in a similar way, though not only promoting but also guaranteeing gender equality in work environments.

This includes the equal recruitment of men and women employees at different levels as well as the promotion of gender equality at high management levels which means the inclusion and equal engagement of men and women not only in ordinary work positions, but also in management positions.[31] The company has created a special special structure which is engaged in the development and promotion of women in positions of high management levels within the organization.[32] From what I mentioned, Henkel's main goal in diversity management is to create an inclusive environment for employees, guaranteeing and implementing a culture of respect and tolerance in the work environment.

Managing diversity in order to create a work environment where every employee feels appreciated and accepted affects the performance of employees and the spirit of cooperation for maximizing the value of the company's income. The model of the strategy selected by the Henkel company in the management of diversity in this way is related to the implementation and development of information sections and trainings that inform and promote the culture of acceptance of diversity, the awareness of stereotypes and the elimination of diversity barriers in the work environment.[33] Also, in view of the above, Henkel has undertaken several campaigns with a focus on strengthening partnership and cooperation with organizations that represent different groups of society. Some of the organizations with which Henkel has partnered are mentioned to be organizations of persons LGBTQI+,

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[31] Hansen K., Seierstad Ch., (2017), Corporate Social Responsibility and the Management of Diversity, Theoretical Approaches and Best Practices, Part III, *"Adding value through evaluation: Reflections on the Henkel case"*, page 237.

[32] See the point 11.

[33] Hansen K., Seierstad Ch., (2017), Corporate Social Responsibility and the Management of Diversity, Theoretical Approaches and Best Practices, Part III, *"Adding value through evaluation: Reflections on the Henkel case"*, page 239.

organizations supporting people with different abilities or organizations representing people with different nationalities.

Through the creation of partnerships, Henkel has taken advantage of the perspective and experience of different groups to incorporate it into the design of its own diversity management strategies in order to increase its performance in promoting as widely as possible a culture of acceptance of diversity.

Another model of the implementation of diversity management strategies by the Henkel company consists in providing opportunities and support for the advancement and professional development of employees without any distinction. Henkel promotes training for employees following different specialization programs in accordance with the different needs they may present.[34] The application of such practices by the company has been proven to directly affect the performance of employees, reflecting the satisfaction of their requirements in very positive *feedback* for the company through its empowerment to achieve satisfactory results in the activity performed.

4. Conclusions

From the perspective of the authors, presented in the book "Corporate Social Responsibility and Diversity Management", diversity management is identified as one of the main indicators of a successful and sustainable corporate social responsibility. In fact, the diversity is a key factor and essential characteristic in the climate of a global market. As a result, managing diversity issues is an inevitable corporate task.

From the analysis of the authors in the book results that the diversity is no longer seen as a challenge by successful corporations which, through the implementation of corporate social responsibility strategies, have succeeded in creating management advantages through the implementation of good management practices from the diversity.

The management of diversity and the implementation of strategies within the PSK through the promotion of the inclusion of all employees has managed to generate a profitable situation for corporations. In order that the diversity management to turn into a competitive advantage for corporations, it is necessary that the latter correctly understand the meaning of diversity and know how to satisfy the interests of different parties to maximize their profit. In general, a good example of diversity management is characterized

[34]Hansen K., Seierstad Ch., (2017), Corporate Social Responsibility and the Management of Diversity, Theoretical Approaches and Best Practices, Part III, *"Adding value through evaluation: Reflections on the Henkel case"*, page 240.

not only by the design of policies, but also by the implementation of concrete, genuine practices that promote gender equality, the inclusion of different ethnic, cultural, religious affiliations, as well as community awareness. of employees to accept diversity and eliminate discriminatory barriers.

Also, a successful diversity management strategy should influence the motivation and incentive of employees to increase performance, a fact which is reflected in the increase of corporate income. Creating an environment that is accepting and highly tolerant of diversity makes employees feel more valued and respected in their work environment, valuing their contributions, fostering interaction among employees and fostering creativity, translating into added value and competitive advantage for the corporation.

Finally, what is concluded from the analysis of the successful cases of corporations treated by the authors is related to the importance of developing trainings and informative sections for the support and continuous training of employees according to the different needs that present different groups of employees. Investing in such ongoing training as well as creating partnerships and interacting with organizations that represent diverse groups are indicators of a successful diversity management strategy and therefore serve as a benchmark for a corporation's success in implementing diversity practices.

In order for a corporation to be considered successful in managing diversity, it must have the capacity and necessary tools for the wide implementation of the strategies and policies of the corporate social responsibility.

Diversity management is not seen as a static process. Influenced by continuous globalization, the diversity management process within corporate social responsibility is characterized as a dynamic process which must be adapted and reshaped constantly in accordance with changes in the external environment and influencing factors of the market where operates the corporation.

In the framework of diversity management, the importance of cultivating a culture of acceptance and inclusiveness in the work environment is emphasized in response to the challenges of diversity and sustainable development, creating a win situation for the corporation, employees, interest groups and society in general.

A Meta-Analysis of Factors Influencing Virtual Consumer Behavior: Insights into Demographic, Psychological, Economic, and Marketing Mix Factors

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Abstract
The widespread adoption of Internet use has propelled commerce into the digital age, impacting nearly every aspect of daily life, including knowledge acquisition and online purchasing of products and services.
[1]. As a result, the study of consumer behavior in the context of e-commerce has gained significant attention. Over the past decade, there has been a notable increase in the literature on online consumer behavior, establishing it as an emerging and important field of research[2].
The purpose of this study is to identify the factors that influence online consumer behavior. To achieve this objective, a meta-analytic study design was employed to gather empirical information from 50 scientific studies published after 2000. These studies, conducted by researchers from various countries and expressed in the English language, provide valuable insights into the factors that shape online consumer behavior in the virtual marketplace.
The findings of this study align with previous meta-analytical research, which consistently demonstrates that virtual consumer behavior is influenced by various factors, including demographic, psychological, economic, and marketing mix factors. By conducting this meta-analysis, we aim to enhance our understanding of virtual consumers and provide valuable insights for both businesses and consumers to leverage these factors effectively, ultimately leading to success in the digital marketplace.
Keywords: consumer, online shopping, demography, psychology, economics, marketing mix

During the explosive growth of the fourth industrial revolution, the role of the digital economy has become essential in daily life. The digital economy is

[1] Jukariya & Singhvi, (2018), f 267
[2] Zhang, Liu, H.,Yao, P. (2021), f 1748

defined as an economy primarily based on digital technology, particularly involving electronic transactions facilitated by digital technology applications. With the increasing availability of online services and the rise of e-commerce, understanding the various factors shaping the behavior of virtual consumers has become paramount. As businesses strive to navigate the digital landscape and effectively engage with online consumers, a comprehensive analysis of the key factors influencing their behavior is crucial. This meta-analysis aims to synthesize and analyze existing research, shedding light on the combined effects of demographic, psychological, economic, and marketing mix factors on virtual consumer behavior.

The digital era has brought profound changes in how consumers interact with businesses and make purchasing decisions. Online shopping offers convenience, variety, and personalization options. However, as the online marketplace becomes increasingly crowded and complex, businesses must uncover the intricacies of consumer behavior to develop effective marketing strategies[3].

Through a meta-analysis of existing research, this study aims to consolidate findings from numerous studies and provide a comprehensive overview of the combined effects of demographic, psychological, economic, and marketing mix factors on online consumer behavior. By identifying patterns, trends, and key areas in the literature, this study offers valuable insights and guidance for future research and practical implications for businesses seeking to optimize their online strategies. The findings of this study will contribute to the development of more effective online marketing strategies and assist businesses in establishing meaningful connections with their online consumers in the dynamic digital market.

Problem Statement

Through a meta-analysis of existing research, this study aims to consolidate findings from numerous studies and provide a comprehensive overview of the combined effects of demographic, psychological, economic, and marketing mix factors on online consumer behavior. By identifying patterns, trends, and key areas in the literature, this study offers valuable insights and guidance for future research and practical implications for businesses seeking to optimize their online strategies. The findings of this study will contribute to the development of more effective online marketing strategies and assist businesses in establishing meaningful connections with their online consumers in the dynamic digital market[4].

[3] Koufaris, (2000), f 4

[4] Behera, Das & Premlatha, (2022), f 190

The proliferation and growing use of online services have driven the development of new models of personal interactions and non-personal transactions, with a higher degree of interactivity and availability. These changes have influenced buyer behaviors

Online shopping is becoming a trend even among Albanians as they find it more convenient, time-saving, and offers numerous choices. When consumers make online purchases, they are influenced by various factors, including price, trust, and convenience[5]. Usually, prices are much lower in online stores compared to physical stores because there are fewer costs associated with physical premises, human resources, or maintenance. Therefore, businesses operating online, by reducing these costs, lower the price of the products they offer online compared to physical ones. On the other hand, the ease and convenience offered by these stores 24/7 have made shopping very easy for consumers, not only in Albania but worldwide[6].

For these reasons, to fully and scientifically understand the diverse nature of online consumer behavior, this study was conceived to help consumers better understand their behaviors, and businesses to achieve higher performance in the digital era we are living in.

Theoretical Explanations

The importance of understanding the factors that influence virtual consumer behavior.

Online shopping has become an increasingly attractive and intriguing trend for consumers. Online shopping platforms like Amazon and Ali Express have become a necessity in everyday life. This is because these purchases are made at a rapid pace and are perceived as highly efficient, taking into account the requirements of modern life characterized by vibrancy and rapid demands.

Changes in consumption patterns bring changes in marketing strategies. For businesses to efficiently conduct online marketing activities, they must understand the characteristics of online consumers, and analyze the psychological motivation of consumers based on marketing, forming a positive and rational psychology of online consumers[7].

Recently, there has been a growing number of businesses using the Internet to perform business functions, including sales and visibility. The Internet has led to the growth of computer-mediated market transactions, where products can be presented and transmitted to buyers. As a result, the decision-making

[5] Balamurugan, Jublee & Sathish, (2017)
[6] Jukariya & Singhvi, (2018), f 8
[7] Lakshmi, (2016), f 60-65

process of online clients is receiving significant attention from global researchers[8].

The term "consumer behavior," which refers to how emotions, attitudes, and preferences influence purchasing behavior, first appeared in the early 1950s as a distinct concept in the social sciences, closely related to the field of marketing[9]. Researchers have defined consumer behavior as all consumer activities involved in purchasing, using, and disposing of goods and services by processes of emotional, mental, and behavioral responses. Consumer behavior, in other words, includes the personal thoughts and feelings experienced by individuals and subsequent actions in the purchasing process[10].

Understanding people's behavior in the online market can help businesses focus primarily on their target customers, predict customer buying behavior, and generate more profits through online commerce. Bellman et al. (1999) described several factors predicting customer purchasing behavior: product information search, time spent online, the number of daily emails, or online work[11].

According to Cheung, consumer behavior on the Internet became one of the emerging research fields around the year 2000, due to the dramatic increase in the number of publications that year. Literature reveals that the majority of discussions regarding consumer behavior are limited to its factors or components. Researchers have different opinions when identifying components of consumer behavior. The literature reports that consumer behavior is measured through various factors[12].

Models of consumer behavior online are presented to deeply understand and predict the wide range of decisions made by consumers based on the background of customer profile factors, online store profile factors, and other intervening factors. Several different models have been developed in recent years to help businesses gain a deeper understanding of online customer behavior[13].

Li et al. (1999) present a conceptual model of factors influencing online purchasing behavior. They believe that convenience, experience, communication and distribution, and accessibility have a positive correlation with online purchasing behavior. Furthermore, three customer profiles,

[8] Ayalew & Zewdie, (2022).
[9] Verplanken & Roy, (2015), f 243
[10] Sima, Gheorghe, Subić & Nancu, (2020)
[11] Pandey & Parmar, (2019)
[12] Balamurugan, Jublee & Sathish, (2017)
[13] Cetină, Munthiu & Rădulescu, (2012), f 5

including gender, income, and education, have a positive impact on online purchasing behavior, as well as other intervening factors[14].

One of the key and most discussed components is related to the online environment, which encompasses several specific aspects such as internet experience and internet self-efficacy, online risk, online technology enjoyment, online transaction familiarity and online shopping intention, navigation, screen clarity, and content relevance, which have received special focus in studies[15].

The pandemic has had a significant impact on consumer behavior and has led to fundamental changes in how a typical customer makes purchasing decisions. This has prompted research to identify the characteristics influencing customer behavior during the COVID-19 period[16].

Another key component widely discussed by researchers is cultural factors. Emphasizing its importance in online consumer behavior, researchers have asserted that culture has a significant influence on online interventions and e-consumers. One of the most challenging tasks in the marketing process is acquiring and retaining customers. In this context, Kim (1999) suggests that the design of an online store should be projected in a way that attracts and retains cross-cultural customers. Researchers have suggested that customer retention is possible only when a website or online store reflects and adapts to an atmosphere of different cultural nuances. Building on Hofstede's notion, Steenkamp, & Wedel (1999) agree that cultural nuances are one of the crucial statements during the study of individual behaviors[17].

Methodology

This literature review includes the selection of 50 scientific articles from the last 22 years, conducting searches in foreign literature using keywords such as 'online shopping,' 'online buying factors,' 'virtual consumer,' 'virtual consumer behavior,' 'e-shopping,' with basic or advanced searches on official scientific websites.

The studies that served as the basis for review and analysis were (1) primarily full papers, (2) meta-analytical articles, (3) articles examining the relationships between personality traits and criminal behavior, and (4) articles published after the year 2000

[14] Koufaris, (2002), f 207
[15] Koufaris & Hampton-Sosa, (2004), f 377
[16] Cetina, Vinerean, Opreana, Raduleschu, Goldbach, & Radulian, (2022), f 3
[17] Pandey & Parmar, (2019)

The abstracts of all studies were read by the authors to select the appropriate works for inclusion in this study. To ensure that no relevant publications were missing, the reference sections of all works were scrutinized.

What are the factors determining online consumer behavior?

This study involves the qualitative analysis of the meta-analysis, which aims to synthesize the qualitative findings from the reviewed studies. The studies in this meta-analysis were systematically coded using a protocol based on meta-synthesis. Thus, the findings of the studies were contextualized into four categories mentioned most frequently in the studies selected for this meta-analysis, providing a general overview of the key findings

Based on the literature review, the key factors influencing online consumer behavior are four:

- Demographic Factors
- Economic Factors
- Marketing Mix Factors
- Psychological Factors Demographic Factors

In the traditional way of consumer buying, consumers are only passive recipients of information, so the seller has always been the dominant position in the entire transaction process, and consumer autonomy cannot be brought into play. In the era of the internet, the global and local nature of culture coexists, and cultural diversity brings about a powerful fusion of consumer product tastes. Consumer concepts are strongly influenced, and young people have a solid motivation to buy culture-oriented products, and e-commerce can fulfill this demand. When traditional culture meets creative design, the strong historical connotation satisfies daily needs with a highly personalized style, not only capturing consumer psychology but also making itself indispensable in the cultural and creative market with many competitors

In the online environment, consumer behavior is most influenced by virtual groups to which they belong and, therefore, by Word-of-Mouth (WOM). According to Schiffman & Kanuk (2009), the types of consumer reference groups are friendship groups, buying groups, work groups, virtual communities, and consumer behavior. Furthermore, age and gender are factors that, according to studies, affect online purchases. Young consumers tend to be more willing and comfortable to make online purchases and exhibit higher levels of time spent on these purchases. This trend, according to studies, is extending to older age, as they are becoming familiar with digital devices. Regarding gender, studies report that women tend to engage in more online shopping activities than men, and these purchases are mainly related to clothing, accessories, and beauty products. Meanwhile, higher education

levels may be more satisfied with technology, have better information search skills, and show higher levels of trust in online transactions[18].
According to studies, besides the culture mentioned above, the geographical location of the consumer also affects online buying behavior. Urban consumers generally have better internet access and a wider range of online buying options, leading to a higher commitment to this phenomenon. However, rural areas are also seeking this service, due to the inability to meet their physical shopping needs, as a result of limited opportunities[19].
Aristotle states that man is a social animal. Therefore, our models of behavior, preferences, and dislikes are greatly influenced by the people around us. We always seek confirmation from those around us and rarely do things that are unacceptable to society. Social factors influencing consumer behavior include family, reference groups, and social status[20].

Economic Factors
The income level directly affects an individual's purchasing power. Individuals with higher incomes generally have more disposable income for expenses, allowing them to make more frequent and higher-value purchases online. They may have the financial means to afford luxury items, high-end products, or premium services available through online platforms[21].
According to studies, disposable personal income refers to the actual income (i.e., money balance) that remains available to an individual after tax deductions and mandatory deductions from gross income. An increase in disposable income leads to increased spending on various items, while a decrease in disposable income leads to reduced spending on various items[22].
Income can also influence the types of products or services that individuals are more likely to purchase online. For example, consumers with higher incomes may be more inclined to buy luxury goods, electronics, or high-priced items available online. On the other hand, individuals with lower incomes may focus more on essential products, discounted items, or offers within their price range[23].
The income level can affect an individual's perception of the risk associated with online purchases. Some studies suggest that individuals with higher incomes may perceive lower risks when shopping online due to their financial

[18] Fredriksson & Rosenborg, (2016), f 20
[19] Cetină, Munthiu & Rădulescu, (2012)
[20] Fekete-Farkas, Gholampour, Bouzari, Jarghooiyan & Ebrahimi, (2021), f 27
[21] Bucko, Kakalejčík & Ferencová, (2018), f 10
[22] Ha, Nguyen, Pham & Nguyen (2021), f 5
[23] Bonera, (2011), f 3

ability to handle any potential negative outcomes. In contrast, individuals with lower incomes may exhibit more caution and skepticism due to concerns about fraudulent activities, financial loss, or product quality.
It is important to emphasize that while income level is an important factor, other elements such as personal values, attitudes, and individual preferences also play a role in shaping online shopping behavior. Furthermore, the relationship between income and online shopping behavior may vary across different market segments and geographical regions. Economic expectations also influence purchases, as studies report that higher expectations for personal budget growth lead to higher expenditures, and vice versa[24].

Psychological Factors:
Psychologists report that consumers respond to dimensions of the physical environment emotionally and cognitively. Emotions have been recognized as important in human responses to the environment and as a guide to behavior and the characteristics of online page design, such as colors, lighting, or music. These elements have been found to influence emotional manipulation for purchases. Emotions drive an individual's motivation to engage in behavior related to joining the virtual consumer network[25]. Understanding consumer motives can help businesses tailor their online strategies to meet specific customer needs and desires. Thus, they shape attitudes toward products displayed online[26]. Attitudes are a combination of beliefs, feelings, and behavioral tendencies towards a particular object or behavior. Positive attitudes towards online shopping can lead to higher levels of engagement and shopping behavior[27].
Therefore, positive and negative attitudes are associated with customer information processing strategies. Positive emotions, according to studies, are associated with heuristic information processing strategies, and negative emotions with systematic information processing. According to psychologists, people react to environments globally and emotionally before analyzing and evaluating them in more specific terms. Initially, emotions are aroused, providing a background for more specific images[28].
As such, customers' virtual emotions influence their perceptions of the type of information, effectiveness, and entertainment on a website. Thus, depending on the emotional states that arise during the initial exposure to the online

[24] Kumar, Umashankar, Kim & Bhagwat, (2014), f 675
[25] Rungsrisawat, Joemsittiprasert & Jermsittiparsert, (2019), f 4
[26] San Martín & Herrero (2012), f 1
[27] Di Crosta, Ceccato, Marchetti, La Malva, Maiella, Cannito, & Di Domenico, (2021), f 3
[28] Yang, Tham & Azam, (2019), f 5

page, a customer may perceive the same products differently. This is because affective reactions are independent of perceptual and cognitive operations and can influence the responses each individual has. Customer emotions are what precedes their perceptions of products. Perceptions influenced by different factors (design, description, price presentation, colors, advertising, etc.) can increase purchasing goals and confidence in the online shopping experience[29].
The three types of emotions according to Mehrabian and Russell (1974) are pleasure, emotional arousal or excitement, and dominance, categorized to understand emotional responses to environmental stimuli. This is the most commonly used framework for measuring emotions in this context. Pleasure is the degree to which someone feels good, happy, content, or satisfied and is an indicator of the "likability" of the website.[30] Excitement is the degree to which someone feels stimulated, active, or vigilant and is an indicator of the "motivational power" of the website. Dominance is the degree to which someone feels in control, influential, free, or autonomous and is an indicator of the "controlling power" of the website. Russell (1979) stated that pleasure and arousal could adequately represent the range of emotions displayed in response to environmental stimuli. However, in online contexts, customers have more control over choice and information processing, so dominance becomes a relevant emotional response and is included in the model[31]
Based on the literature review, only 45% of people buy daily necessities online, and the rest are compulsive buyers. Some personality traits embodied in consumption are endlessly reinforced. Modern consumers are often imaginative, change-hungry, innovative, and intensely curious[32].
Individuals who make online purchases have a greater need to make unique purchases, seeking products that set them apart from others. They are more demanding when it comes to personalized products. They choose not only the practical value of the product but also something different that fully reflects individual value. Therefore, online purchases create a unique environment that arouses curiosity and personal emotional change in individuals. In this way, consumers can challenge businesses on their own terms to focus on themselves and act on their ideas[33].
Personality traits like risk tolerance influence online shopping. Exploratory, impulsive individuals who enjoy adrenaline rushes tend to be most motivated to make online purchases, making quick, unplanned, and large-scale

[29] Yulia & Ekawati, (2021).
[30] Kunieda, (2014), f 6
[31] Guo, Wang & Wu, (2018), f 2
[32] Szlachciuk, Kulykovets, Dębski, Krawczyk & Górska-Warsewicz, (2022)
[33] Cinar, (2020), f7

purchases. On the other hand, hedonic and utilitarian orientations make consumers part of online shopping to prioritize novelty and emotional satisfaction (hedonics) and convenience or efficiency (utilitarët)[34].
On the other hand, technophobia is a hindering factor for online shopping, according to studies. Technophobia is related to the fear of making any kind of online purchase, making individuals more resistant to technology trends, and reducing their readiness to become virtual consumers.

Marketing Mix Factors:
Marketing mix factors, also known as the 4Ps (Product, Price, Place, and Promotion), according to studies, can significantly influence online purchases. More specifically[35] :
Product: The product factor refers to the characteristics, features, and value proposition of the offer. Online consumers are influenced by factors such as product quality, variety, personalization options, and uniqueness. Having a well-designed and attractive product, accompanied by accurate product descriptions, images, and customer ratings, can enhance the online shopping experience and increase purchase intentions.
Price: Pricing strategies and perceived value play a crucial role in online shopping behavior. Online consumers are highly price-sensitive and tend to engage in price comparisons across different platforms. Offering competitive prices, discounts, promotions, or free shipping can stimulate online purchases Transparent information on prices and a clear breakdown of costs can help build trust and reduce perceived financial risks[36].
Location: The factor of location in the online context refers to the availability and access to products through digital channels. Online consumers expect convenience and easy access when making purchases. Factors such as website design, navigation, and mobile notifications can impact the overall user experience.
Promotion: Promotion involves various marketing activities aimed at creating awareness and stimulating consumer interest. In the online environment, effective promotion strategies include digital advertising, search engine optimization (SEO), social media marketing, influencer collaborations, email marketing, and content marketing. Personalized and targeted promotional messages tailored to specific consumer segments can increase engagement and conversion rates[37].

[34] Diehl, Morales, Fitzsimons & Simester, (2011), f 20
[35] Wulandari, Nafikadini & Rokhmah, (2020), f 5
[36] Nur, Andriani & Kusdi, (2018), f 8
[37] Sulaiman, Yusr & Ismail, (2017). F 6

Individuals: Although not part of the traditional 4Ps, the individual factor plays a crucial role in online consumer behavior. Online buyers rely on customer reviews and recommendations to assess the trustworthiness and reputation of online sellers. Offering exceptional customer service, including prompt responses to inquiries and addressing post-purchase concerns, can increase trust and satisfaction, leading to positive online shopping experiences.
Process: The online shopping process itself influences consumer behavior. Simplifying the purchasing process with clear steps and a secure payment process is essential. Customizing registration and payment processes and providing multiple payment options can reduce dissatisfaction and increase conversion rates[38].

Conclusion:
Understanding and considering the various factors that influence online shopping behavior is essential for businesses aiming for success in the digital market. Demographic factors such as age, gender, income, education, and geographical location provide valuable insights into the characteristics and preferences of virtual consumers. Younger consumers, individuals with higher incomes, and those with greater access to technology are more likely to engage in online shopping.
Psychological factors, including perception, motivation, attitudes, trust, perceived risk, social influence, emotions, and personality traits, play a significant role in shaping online purchasing behavior. Consumers' perceptions, motivations, attitudes, and emotional reactions influence their decision-making process and determine the level of trust and ease they experience when shopping online. Personal characteristics, such as risk tolerance, need for uniqueness, impulsivity, and information-seeking behavior, further impact online consumer behavior.
Additionally, economic factors, especially income levels, affect consumers' purchasing power, product preferences, perceived risk, and online spending habits. Individuals with higher incomes generally have more disposable income and may exhibit a greater willingness to spend online. However, income alone does not fully explain shopping behavior, as personal preferences and value perceptions also come into play.
Lastly, the marketing mix, represented by the 4Ps (Product, Price, Place, and Promotion), provides businesses with key strategies to influence online consumer behavior. Offering attractive products with clear value propositions,

[38] Lin, Wu & Chang, (2011), f 276

competitive pricing, convenient online access, and effective promotional campaigns can improve consumer engagement and purchasing intentions.
To adapt to the changing consumer behavior in the Internet age, it is necessary to create a favorable business environment and promote sustainable economic development through the role of the Internet.
Taking into account the combined influence of demographic, psychological, economic, and marketing mix factors identified in this literature review, businesses can better understand online consumers, tailor their strategies, and create a positive and appealing environment for online shopping. It is crucial to continually adapt and refine these strategies to meet the evolving expectations and preferences of consumers in the digital field.

Recommendations:

- Based on the findings of this study, several recommendations have been formulated to help businesses effectively influence online consumer behavior, improve customer satisfaction, and stimulate online performance growth.
- Personalization of the online experience: Customize product recommendations and user experiences based on demographic information to increase engagement.
- Building trust and minimizing perceived risk: Implement strong security measures, transparent privacy policies, and secure payment options to alleviate consumer concerns.
- Understanding and utilizing psychological motivators: Create persuasive product descriptions, visual displays, and messages that align with consumer desires and motivations.
- Optimization of pricing strategies: Offer competitive pricing, discounts, and promotions. Implement personalized discounts based on consumer behavior and value perceptions.
- Enhancing the online shopper's experience: Ensure a seamless and comprehensive experience with responsive website design, mobile applications, and efficient order fulfillment and delivery processes.
- Continuous monitoring and adjustment of strategies: Regularly analyze consumer behavior data to stay updated on evolving trends and maximize online marketing strategies based on customer responses and market dynamics.
- Promoting a positive online reputation: Respond professionally to customer comments and messages, encourage positive reviews, and actively engage online to maintain a positive business image.

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