An Exploratory Case Study: Risk Filter Applicability to the Digital Strategy of the Education System in Romania. The Light at the End of the COVID-19 Tunnel

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DOI: 10.56177/red.7.2022.art.5

Abstract

By probing into the *Strategy regarding the digitalization of education in Romania* updated in 2021 by the Romanian Ministry of Education and Research after the COVID-19 and aligned with the latest European Digital Agenda for 2020-2030 published by the European Commission, we are hoping to offer future researchers a set of propositions to continue the inquiry on possible opportunities derived from emerging risks associated with the digitalization. This exploratory case study aims to identify a positive application of the risk filter that is capable to assess not only the range of risks, but also their systematicity, while planning a governmental digital strategy in a critical system like education. We believe that this topic deservers immediate attention, because of the unique opportunity offered by the COVID-19 pandemic, and because a good implementation plan is one of the strongest predictors of a successful strategy. As researchers, our hope is that by understanding the systematicity of risks which could influence the implementation of digital strategy in the education system in Romania, policies and programs can be developed further based on risk analysis and correct prioritization of operational plans.

This research was an exploratory case study in which a digital strategy was analysed, and the characteristics of systemic risks have been mapped to the operational plans. It was concluded that the systematic filters identified for the risks could be used for planning the projects, to identify areas of risk exposure during planning and at various stages during the preparation of

projects. The final outcome of the case study is that the identification of systemic risks can help with the management of each project and could lay the foundation to a project database.

Keywords: digital strategy, risk management, digitalization, education system, project management.
JEL Classification: I11, I15, I18, I21, I28.

1. Introduction

What seemed like a trivial flu epidemic turned out to be a pandemic that affected all of humanity: public health, economic development, social relations, education, culture, sports. Under the rule of restrictions imposed by quarantine measures, all mankind had to change their way of life almost overnight. The negative effects on the state of the economy and especially those resulting from the application of quarantine measures have caused immense damage to the global economy, which experienced a sharp decline. Many of the economic axioms have been called into question; the crisis has shown that resilience - the ability of an economy to keep up in times of turbulence - has become a major attribute. But there is light at the end of the pandemic tunnel. COVID-19 has closed many doors, but the technology gave all of us a window of hope. All the technologic discoveries brought hope for a better life, a smarter business environment and a more inclusive world. Digital technologies are now imperative for working, learning, entertaining, socializing, shopping, and accessing everything from health services to culture.

The novel Corona virus disease (COVID-19) outbreak was declared as a pandemic by the World Health Organization on 11th March 2020, when fear and panic appeared all around the globe. Due to this situation, educational institutions around the globe have shifted their operations to online learning (Rafi, Varghese, & Kuttichira, 2020). Pandemic crisis affected health, political, economic, and social environment, but especially the educational one. COVID-19 period brought in education (learning, teaching, communication, collaboration, evaluation) many changes among students and teachers. Special platforms developed by the Romanian Ministry of Education and Research, by universities, and office-meeting software (like Teams, Zoom, Webex, Skype, or FaceTime) offered the opportunity to promote online education and restore the normal teaching order (Chen, Peng, Yin, Rong, Yang, & Cong, 2020). To minimize the impact of the pandemic on education and control the spread of the pandemic, online teaching has

become a necessary strategy to restore the normal teaching order in this special period (Chen, Peng, Jing, Yang, & Cong, 2020). Through e-learning fragmented disciplines got virtual homes that connected the fragments together in an integrated presentation. Organisationally, there is not one digital learning space, but many, and they intersect with hybrid and physical spaces. The opportunities illustrate that the digital learning space enables new forms of knowledge development, including new actors outside the educational institutions. (Bygstad, Øvrelid, Ludvigsen, & Dæhlen, 2022).

According to the UNICEF's *Report for Building Resilient Education Systems beyond the COVID-19 Pandemic* (UNICEF Regional Office for Europe and Central Asia, 2019) the COVID-19 pandemic closed schools and pre-schools, intermittently, across Europe and across the world. This has affected millions of children, from pre-schoolers to high school students. The pandemic has profoundly affected the process of educating children and exacerbated existing social inequities in countries like Romania. Children from low-income families, children living in rural areas with poor digital infrastructure, children from ethnic minorities, children with disabilities. The challenge that the teachers, school principals, education systems officials and decision makers from local and national level faced was significant, and the impact on children, young people, families, communities, and societies will be felt sooner or later. Therefore, improving the resilience of the education system, by planning an inclusive education should be a top priority for the coming months and years, and should be the basic principle for rebuilding better education (UNICEF Regional Office for Europe and Central Asia, 2019).

While the pandemic significantly disrupted teaching and deepened inequalities in Romania, it has also provided opportunities for the much-awaited digitalization of the education system. These valuable experiences must lead to important lessons learned, which can be incorporated into planning and reforming the Romanian education in the coming years. This is an opportunity not to be missed, which requires a process designed to continuously assess the situation, which intends to address immediately the technological gaps in access to education for everyone.

A provocatively article Harvard Business Review, intitled *IT Doesn't Matter* (Carr, 2003), argued that Information Technology (IT) has become so ubiquitous, that its strategic importance has declined. IT is easy to replicate because it is a commodity that any organization can buy from the same IT suppliers. Parallels were made with railroads, telegraphs, and electricity to urge

firms to spend less, manage risks, or obsess over opportunity. For example, if we replace the word "IT" with "electricity", let's say, this is no longer a competitive advantage because everyone has it. Organizations can spend less and manage risks better, without becoming heroes. The argument is correct, but its premise is incorrect, as the ancient Greek philosopher Aristophanes identified this type of argument as a false premise (Tiwana, 2017). The incorrect premise in this scenario is that Romania is at the same level of digitalization as the rest of the European countries, because according to the latest European report, Romania is once again in the last place on the EU's digital ranking (DESI, 2022).

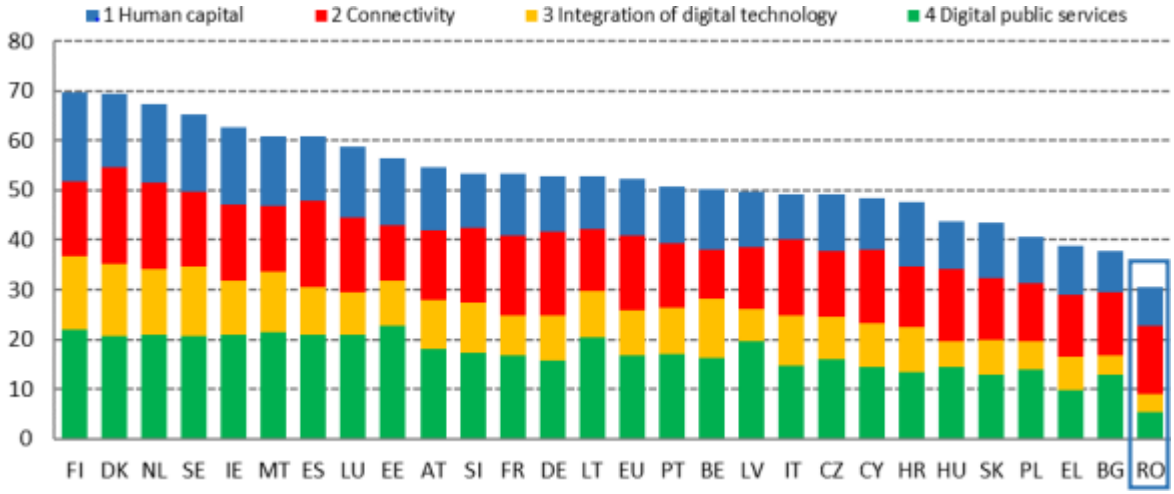

Chart 1. Digital Economy and Society Index (DESI) 2022 ranking.

Source: European Commission, 2022.

This can mean at the same time a big risk if the lockdown situation returns and the access to onsite education is stopped again, but also a big opportunity for creating a digital advantage if the digital strategy is well defined and planned. According to the UNICEF's report, the main opportunities identified to rebuild better are: providing IT devices and internet access for the most marginalized students, IT development and support for teachers and school staff, addressing the digital divide by location, income, and gender, exploiting the potential of online educational environments, mobilize education experts to create guidance and digital training packages for teachers and children, policies and investments for the IT System to provide disaggregated and sensitive data for monitoring systems, and improving the Integrated Information System of Education in Romania (UNICEF Regional Office for Europe and Central Asia, 2019).

This paper aims to review the literature in the field of Digital Strategy and systemic risks, while performing an analysis of the *Digital strategy of the education system in Romania* (Romanian Ministry of Education and Research, 2021). The final goal is to match recommendations extracted from the existing academic studies, literature, and the exploratory analysis.

2. Romania's digital Status Quo, as part of the EU

With a score of 30.6 points, Romania is behind all other EU states, according to the latest Digital Economy and Society Index (European Commission, 2022), throughout which the European Commission monitors the digital progress in the European Union. The EU average is 52.3 points.

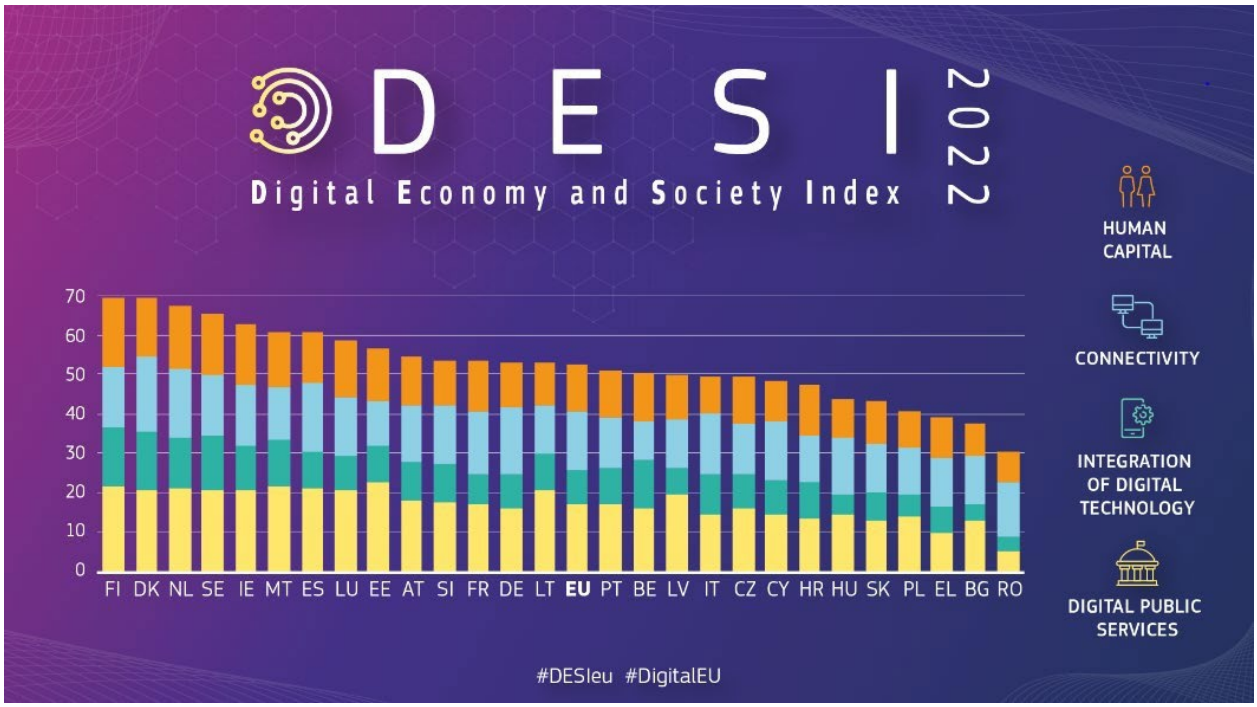

Chart 2. Digital Economy and Society Index 2022.
Indicators on Europe's digital performance published by the European Commission.
Source: https://digital-strategy.ec.europa.eu/en/policies/desi

While Romania maintains high positions for women working in Information Technology (ranking 2nd), for Information Technology graduates (ranking 4th), and connectivity (which surpasses the EU average), it is below the average in several other areas, such as the level of basic digital skills in the general population and a low level of digitalization when it comes to public services and businesses.

The European Commission published in September 2020 a new action plan for digital education, called *2021-2027 Resetting education and training for the digital age* that complements and continues the first action plan for digital education, adopted in January 2018. Beforehand, the European Commission carried out an extensive public consultation process for the revision of the action plan for digital education between June and September 2020, and approach all together over 2700 contributions and 136 position papers from 60 countries. According to the aforementioned study, Romania was represented by a total of 1,576 responses (out of a total of 2,716 responses), which represented 58% of the total sample – a share that reflected a major interest in this field. According to the mentioned study, at the EU level the main issues addressed reflected the fact that approximately 60% of the respondents did not use distance or online learning tools before the pandemic, 95% of respondents believe that this COVID-19 crisis marks a point from which there is no going back to the way technology was used in the field of education and training, respondents stated that pedagogical resources and online content must be relevant, interactive and easier to use, more than 60% of respondents believe that they have improved their digital skills during the pandemic, and over 50% of them want to learn more and improve the acquired digital skills.

Whether we like it or not, according to the activity report of the International Association of Economic and Social Councils and Similar Institutions, the digital revolution is not just a simple concept but is actually a reality that influences our lives (AICESIS, 2019). In Romania, the progress of integrating technology into education continues to be slow. Most young people in Europe use the Internet for social activities. Mobile Internet access has grown significantly in recent years, but the use of technology for educational purposes has not kept the pace with these developments. Not all primary and secondary schools have broadband Internet connection and not all teachers have the skills and confidence to use digital tools in their teaching-learning-assessment work. Learning outcomes can be improved and equity and efficiency could be increased with the help of digitalization of the education systems, with adoption of new services, technologies, and digital skills. To achieve maximum efficiency and sustainability, digitalization must be supported by well-trained teaching staff and must have clear teaching objectives. Improving education and skills in Romania is therefore a key element of the overall vision for digital transformation in Europe (Holotescu, Grosseck, & Andone, 2020).

The 2021 edition of the 2021 Education and Training Monitor: report for Romania (European Commission, 2021) presents a well-known reality. The early school leaving rate in Romania has increased with 0.3% compared with the previous report to 15,6% in 2020, from 15.3% in 2015. Although it represents the largest decrease (-3.5%) of this indicator, recorded at the level of the 27 states of the European Union, during the last 5 years, the indicator continues to remain at a high value, above the 9,9% target set at the level European for the 2020 horizon. According to Eurostat data, in 2021 Romania scored the lowest share of people aged 16 to 74 who had at least basic overall digital skills, placing Romania on the last position once again, Bulgaria being second last with 31% and Poland third last with 43%.

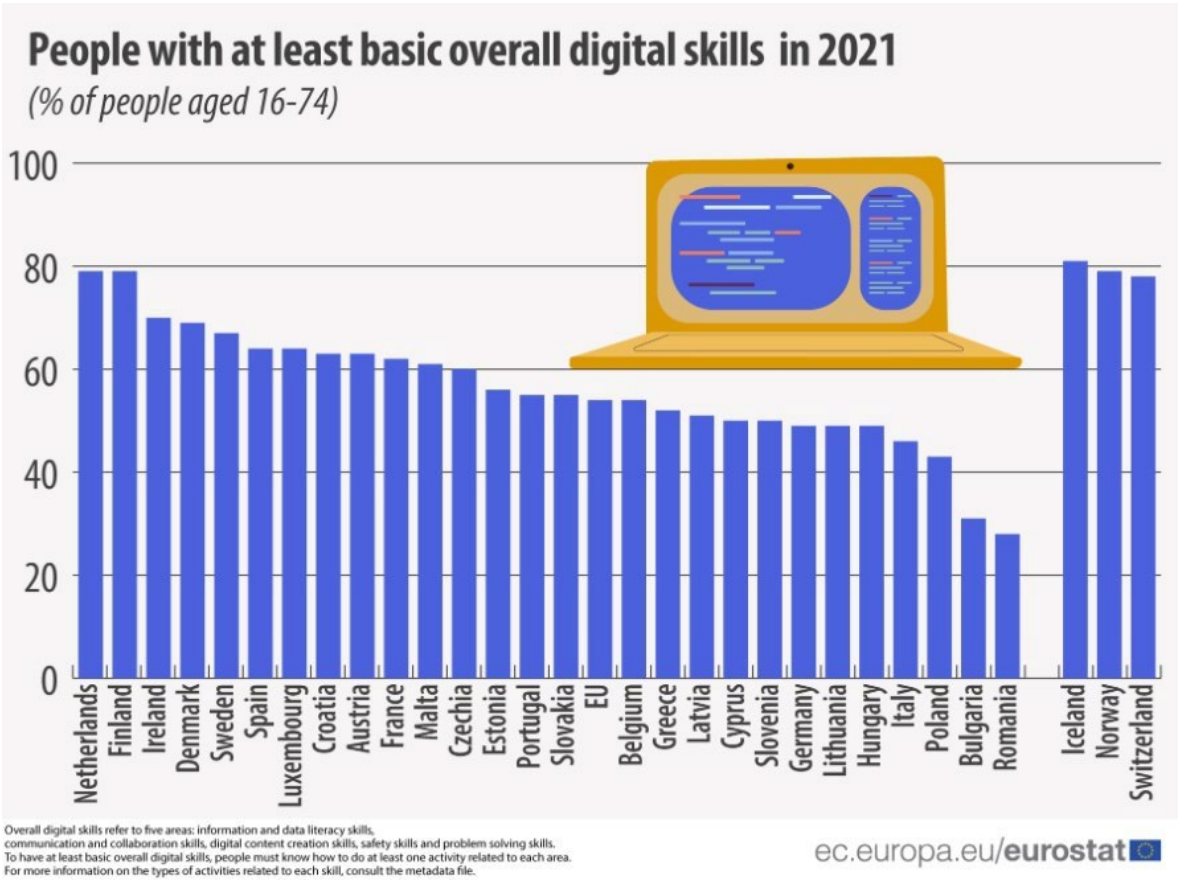

Chart 3. Digital skills for EU countries people aged 16-74.

Indicators published by Eurostat.

Source dataset: isoc_sk_dskl_i21

According to Eurostat's report from 2021, also the young people aged 16 to 24 from Romania are in last place in the EU in this regard, with below 50% of them having basic digital skills or above the basic level. This reality once again supports the need for and importance of investing in the development of digital skills in pupils and students. Digital transformation in the European educational systems validates the future roadmap to sustainable education management. Gaining relatively a sustainable position for education demands its preparedness to adapt to impactful changes imposed by the macro environment, and also integrating the key trends as part of their digital transformation strategy, with emphasis on (a) enhancing the understanding of higher education competitive advantages specific to digital transformation strategy, (b) its impact on institutional management and performance, (c) developing empirical insights by performing comparative studies and analysis of the strategic elements of evolutionary learnings and (d) examining the drivers that shape the digital transformation in post-covid-19 pandemic (Mohamed Hashim, Tlemsani, Matthews, 2022).

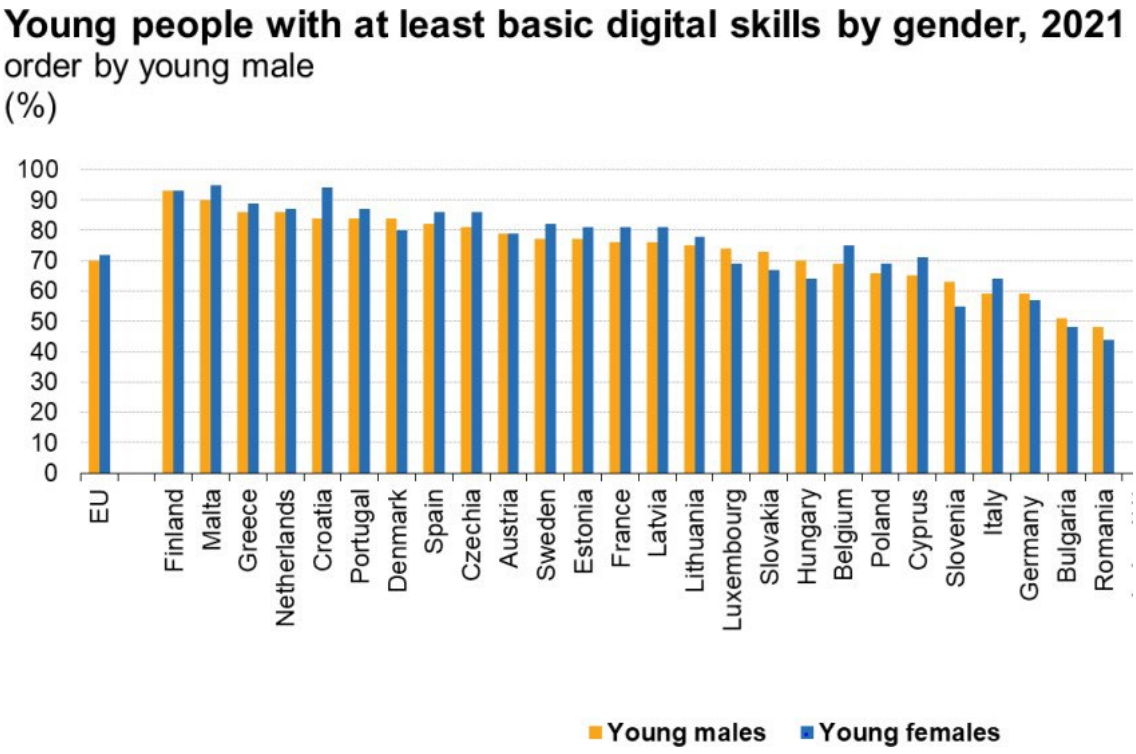

Chart 4. Digital skills for EU countries people aged 16-24 by gender.

Indicators published by Eurostat.

Source dataset: isoc_sk_dskl_i21

Digitalization can make offers of products and services more customized (Pech, Vrchota, 2022) due to the use of large data existing in data bases of companies and their relationship with stakeholders (Florea, & Duica, 2019). Digitalization of processes or activities can provide a huge variety of different products and services online (Patowary, Peulers, Richter, Melovic, Nilsson, & Soilen, 2021). Companies, because they act in a very complex and challenging context must offer innovation to be in front of other companies and to retain and maintain customers (Florea, & Duica, 2020), and new technologies offer them this opportunity (Schallmo, & Tidd, 2021). Digitalization and digital technologies easy the transit to a circular economy using Cyber-Physical Systems (improving management, developing new services), IoTs (developing new effective strategies for waste management, creating new intelligent environments, creating new efficient services), Big Data and Analytics (creating automated approaches, open source tools, or innovative business models) and simulation systems (optimizing performance along SCM, improving material flows, regeneration of products) (Schallmo, & Tidd, 2021).

The Romanian National Strategy on the Digital Agenda for Romania 2020 (Romanian Government, 2015) considers that "full implementation of the strategic vision of ICT in Romania will lead to total investments of about 2.4 billion euros. The direct and indirect impact on the economy can be translated into an increase in GDP of 13%, increasing the number of jobs of 11% and reducing administration costs by 12% in the period 2014-2020". In order to track the digital evolution of each country, the Digital Economy, and Society Index (DESI) is published every year by the European Commission. It measures status on five criteria: connectivity, human capital, internet use, digital technology integration and digital public services and each category is based on several indicators like broadband connectivity, digital skills of human capital, digitalization of business and e-commerce, digital public services (Burlacioiu, Moise, Boboc, & Croitoru, 2018). From 2018 onwards, Romania ranked last or second last every year.

	RO Rank	EU Member States	RO Score	EU Score
DESI 2022	27	27	30.6	52.3
DESI 2021	27	27	32.9	50.7
DESI 2020	26	28	40	52.6
DESI 2019	27	28	36.5	52.5
DESI 2018	27	28	35.4	49.8
DESI 2017	28	28	32.0	46.9

Table 1. Digital Economy and Society Index (DESI) in the EU compared with Romania.
Source: European Commission

From infrastructure and the quality of broadband internet services perspective, Romania is among the first countries in the EU – an aspect that certainly weighed heavily in the EU's decision to set up in Bucharest the European Centre for Cyber Security. But Romania has been noticed also for a strong polarization: on the one hand, 49% of households are connected to high-speed internet services, and on the other hand, a fifth of Romanians have never used internet services, and more than a third have basic digital skills. In terms of the degree of digitalization of the economy and public services, Romania is on the last place. Unfortunately, the internal absorption of professional solutions and services remains very low in the central and local public administration, and in the companies with majority local capital.

With a few notable exceptions, the pioneers of digitization in the private sector are multinationals, which carry out large-scale projects initiated by their parent companies. But even in more mature and technology-savvy industries, local IT investment is significantly lower than in Western Europe (Deloitte, 2020). The investment required for the digital transformation in any organization or country is not negligible, and it usually extends beyond the financial aspects. Nevertheless, the benefits of such an effort are unequivocally positive (Deloitte, 2020). Digital transformation is a long process, it requires a strategic approach and sustained effort, but it pays off from the beginning. It is not just a way for an organization to do everything better and faster, but a way for it to do what was not possible before. Digitalization is important and have many advantages, but there are also some disadvantages as: loss on information due to analogue-to-digital conversion, synchronization die to symbol-to-signal distortion, processing speed, and channel transmission issues (Samoilenko, 2022)

3. Review of the literature

3.1 The foundation: the IT Portfolio trifecta

An **IT portfolio** (Tiwana, 2017) is an entire collection of IT assets extending over three broad classes: IT infrastructure, IT apps, and the data that flows through them. Thinking of the whole portfolio whole even when it is changing one project at a time, it gets clearer how data and the software (apps) are assemble to serve a distinctive purpose (Tiwana, 2017). The **IT infrastructure** is the system-wide technology foundation, shared by the various apps that certain

functions use, includes a digital plumbing that moves data (e.g. the network that connects hardware to the interne), and stores data (e.g. storage) and the IT support (operations, maintenance, and support). Hardware (is anything that you can kick – laptops, smartphones, scanners, printers, servers) and the network are the most visible parts of the IT infrastructure. Although hardware is the most visible, it represents approximately 10% of the overall IT budget (Tiwana, 2017).

IT apps are software programs that individuals from different functional lines use for their core activities. Apps is short for enterprise-grade software application programs, either purchased or custom developed. Anytime anyone interacts with any software anywhere, it is using an app. Apps consume only 20% of the IT budgets but generate almost all the competitive differentiations from IT investments. When they interwoven with the IT strategy, they can punch way above their weight. Apps can be either operational or strategic. Operational apps can support core processes (e.g., inventory, payroll, human resources, accounting, mobile tools, websites, word processors, spreadsheets). The strategic apps attempt to create a competitive advantage by doing something valuable. These apps may introduce new ways of interactions, expand the system, help governance to make better decisions (Tiwana, 2017). **Data** is the most important asset at the heart of all IT systems. Fundamentally, IT is all about data (Tiwana, 2017). A fracture is a crack that heals into a changed industrial structure. Three IT-centric drivers are disrupting existing industries: (1) digitization, (2) infusion of software in non-IT offerings and (3) ubiquity (Tiwana, 2017).

DRIVER	WHAT IT MEANS?	CONSEQUENCE
DIGITIZATION	Digitization of a product, service, or activity that was previously physical	Geographical constraints are erased
INFUSION	Education software into a product, service, or activity	Products become an activity
UBIQUITY	Ubiquity of cheap internet	Costless communication occurs at the speed of light

Tabelul 2. The trifecta's consequences.
Source: Tiwana A. (2017), *IT Strategy for Non-IT Managers*, p. 13.

Digitization is the conversion of a product, service or activity into an electronic form that was historically physical. The earliest industries to be overwhelmed by digitization were music, books, and movies. It is now the turn of manufacturing, services, finance, engineering, medical, insurance, advertising, education, and retail. To understand their impact, we need to recognize *what* can be digitized (Tiwana, 2017).

Infusion means software turned into products and services. There is increasing software content in products and how they are produced and delivered. The consequences of software infusion are twofold. First, all industries increasingly acquire unique features for software. Second, IT is gradually turning products into services, which require new and different business models. In theory, service companies have higher long-term revenue potential. Services create an ongoing revenue stream (unlike the one-time sale of products), their value determines prices (unlike products that are priced by adding a mark-up to costs), and they can retain customers over the long term (Tiwana, 2017).

Ubiquity refers to the proliferation of cheap and fast internet connectivity, anywhere. People, computers, smartphones, and a growing variety of unexpected objects can increasingly communicate literally at the speed of light at near-zero cost over great distances. Increasing ubiquity has no economic or technical constraints. Competition guarantees lower costs. The cost of Internet connectivity is asymptotic (gets closer and closer to zero, but never reaches it). Omnipresence is a powerful tool at everyone's disposal, but it must be used to create business value (Tiwana, 2017).

The confluence of the three factors – digitization, software infusion and ubiquity, creates terrifying and exhilarating possibilities in many industries. It precipitates radically new models, entirely new classes of competitors, and a re-imagining of organizations. The digitization-infusion-ubiquity trifecta can cause unprecedented scale and specialization in services and education (Tiwana, 2017).

3.2 Digitalization strategy in Romania

For Romania to fully benefit from the momentum of the digital transformation in the European Union, and to take advantage of the digitalization process of technologies in the education system, immediate action must be taken to seize the opportunities. According to the *National*

Strategy on the Digital Agenda for Romania (Romanian Government, 2015), there is an urgent need for growth as the strategy focuses mainly on the Information Technology & Communication sector. and aims to contribute to Romania's economic growth and competitiveness through direct action for digitalization. The Strategy was created using the *Digital Agenda for Europe* (European Commission, 2010) as a point of reference for defining an overview of how to strengthen the digital economy from 2014 to 2020.

After analysing the series of aspects covering e-government in Romania, it was concluded by some researchers that, to better digitalize the public sector, the Romanian Government could focus more on its citizens rather than on developing tools, as the main problems stem from convincing the public that the digitalization and technological change is needed, rather than implementing new technology into daily operations. Even if the digital infrastructure exists and Romania benefited from the European funds and directives by creating web platforms to reduce bureaucracy, the key element remains the digital interaction with the public (Bucur-Teodorescu et al., 2022). Romanian education system has also undergone intensive digitalization. In 2001, a government program called Computerized Educational System [Sistemul Educaţional Informatizat (SEI)] was launched to computerize the Romanian education system. Another government-level target was to achieve the objectives of the National Plan for European Union membership by equipping all pre-university education institutions with computer laboratories (Bucur-Teodorescu et al., 2022).

An interesting finding was the tight relation between inter-county differences in Romania's school digitalization processes and GDP per capita between the counties. To mitigate this gap, the RO-NET project (MCSI, 2011) was launched in 2011 to build national broadband infrastructure in socio-economically disadvantaged areas by using structural funds. Additionally, in 2005, a special IT&C course became compulsory in education in pre-service teacher training. With increasing access to computers and the internet, teachers began to take advantage of technology to encourage students to learn; however, computer science, as a subject, became mandatory only in 2017, based on an order issued by the Minister of National Education (Hatos A. et al., 2022). Moreover, in 2019 the Minister of National Education launched a national project for teachers for updating the didactical strategy, and in 2020 the all activities shifted forcefully by the COVID-19 pandemic from being on-site to being online. Teachers had to learn

how to use virtual tools for education, as well as to share these experiences with their colleagues (MEC, 2014-2020).

The Romanian education system faced a very big challenge to rapidly shift all didactic activities from on-site teaching and learning to the online environment. Nevertheless, this uniquely challenging period allowed teachers to develop their digital skills and practice teaching by utilizing apps, software, videos, and films, when the online environment was the only option for keeping in touch with their students (Saavedra, 2020).

Looking at the young students that do have access to digital devices and access to high-speed Internet in Romania, the ubiquitous access to digital devices and internet connection makes nowadays teens and young adults always *connected*, constantly checking and using their mobile devices. Smart phones are the most at hand device, usually also with internet connection, easily making their users prone to what some called "smart phone addiction" (Gökçearslan et al., 2016). Therefore, it is natural to think that their habits will be prolonged also at work or during classes. The most intriguing and problematic aspect revealed by a large amount of research is that instead of leveraging their digital abilities for improving the quality of their academic achievement, students frequently use technology mostly for social and leisure purposes to the detriment of their overall academic performance, and socio-emotional functioning (Van der Schuur et al., 2015).

According to researchers, Romania is dealing with a widespread use of computers and mobile devices, as well as with problematic internet use, especially in the urban areas (Labăr A.V. et al., 2020). In universities, IT&C has been integrated in the academic field mainly as a teaching tool and mostly under teachers' controls. Students do not use computers, laptops or tablets during classes (except for very few specific practical laboratories), they are not required and, most of the times, they are not allowed to bring and use them. Nevertheless, almost every student has a smart phone, and, except for the evaluation sessions, teachers do not forbid them. Officially, there is no explicit/implicit rule or norm preventing smart phones use, hence smart phone multitasking. (Labăr A.V. et al., 2020). The problem comes from the lack of improving their digital abilities and the quality of their academic achievements, because students frequently use technology mostly for social and leisure purposes. (Van der Schuur et al., 2015).

3.3 Systemic risks

The authors of *Systemic risk assessment: A case study* (Ackermann, Eden, Williams, Howick, 2007) analysed in detail ten major engineering projects and clearly showed the synergy between distinct types of risks that can become the source of the biggest problems during a project execution (Eden et al., 2000; Williams et al., 1997 and Eden et al., 2005). Only classifying the stand-alone and limited number of risks does not add much value to a project, as an important impact comes from a wider range of risks and their dependency.

It is frequently acknowledged that risks in a technical complex environment (such as IT or digital) can impact one another. Therefore, the interrelation of possible risks in different areas can have a domino effect and increase the probability of deriving new undetected risks somewhere else. Risks can be interpreted as a network of interrelated possible events, which may be referred to as *risk systematicity* (Gonzalez, & Eden, 2022).

The authors of *Systemic risk assessment: A case study* identified a need to expand the sphere of risks classification and also define their dependency while assessing the risks. A concept of developing a Risk Filter was developed in the risk evaluation phase, to *filter* out the projects that do not need deeper analysis and recognize those ones that need further analysis. An important prerequisite to capture not only critical risks, but also a wider range of them and their interdependency, it was the analysis of real past projects that experienced significant problems (Yin, 1994 & Stake, 1995).

By tapping into forensic analysis of real projects, the risk identification, and the *risk systematicity* has the potential to create a real foundation, rather than hypothetical. Moreover, it was determined that by initiating the risk assessment from the ground up, in the same way as the development of *grounded theory* (Glaser, 1992), the planning will not be influenced by preconceived notions generated by other risk assessment methods and general practices. Furthermore, it was emphasized that any organization could easily enrich its knowledge and risk repository throughout internal workshops and utilizing causal mapping and a Group Support System (Ackermann, & Eden, 2001).

4. Exploratory case study on the risk filter applicability to the digital strategy of the education system in Romania

4.1. Study aims and research questions

This exploratory case study aims to provide recommendations extracted from the research on *Systemic Risk assessment: a case study* for identifying the Risk Filter applicability to the future projects underlying the *Digital strategy of the education system in Romania*.

The main research questions are:

1. How can the risk filter can be identified and applied to the strategic planning of the *Digital strategy of the education system in Romania*?
2. Why is the risk filter important in relation to the *Digital strategy of the education system in Romania*?
3. What could be the outcome of applying a Risk Filter to the strategic planning of *Digital strategy of the education system in Romania*?

4.2. Comments on the method

Case studies are a popular research method in business and technological areas (Dudovskiy, 2022). Case studies aim to analyse specific issues within the boundaries of a specific environment, situation, or organization. A case study is a particular strategy for qualitative empirical research that allows an in-depth *investigation* of a contemporary phenomenon *within its real-life context* (De Massis, & Kotlar, 2014).

Exploratory case studies aim to find answers to the questions of *how*, *why,* or *what*. For this research, an exploratory case study methodology was chosen in analysing the specific boundaries of the systemic risks and risk filter applicability in strategic planning of the *Digital strategy of the education system in Romania.* An analytical method of the existing literature and cross-checking with the boundaries of the use case due to absence of data collection and analysis within the context of phenomenon. As a conclusion, there can be multiple set of outcomes to all three research questions.

4.3 Applicability of the risk filter

The following steps have been extrapolated from the *Systemic Risk Assessment: a case study (*Ackermann, Eden, Williams, & Howick, 2007) that can be applied by the Romanian Ministry of Education and Research while planning the strategic sub-projects derived from the *Digital strategy of the education system in Romania*.

1. Definition of an initial risks list by 1.1 analysing real past governmental projects related to digitalization that had experienced significant problems, to ensure that the risks identified and their dependency have a realistic background, or by 1.2 organizing workshops with relevant key people with knowledge about past failed projects and record their feedback.
2. Development of an initial list of risks and design of a survey that could be shared and filled in individually by respondents at a convenient time for them, to increase the chance of feedback. Compilation and examination of similar characteristics and other variations.
3. Establishment of what are the possible risk events (precursors to questions) by identifying main classes of risks (together with the low risks) that are enclosed in the sub-projects derived from the strategy's priority axes.
4. Prioritization of possible risk events by exemplifying scenarios around events that could generate risks, capturing the cause and effects.
5. Prioritization of the risks by project characteristics of the scenarios and editing them to take form of a question.
6. Re-clustering the risks identified so far to establish fundamental sub-classes of project features.
7. Observation of emerging questions in more than one sub-class because of multiple dependencies.
8. Identification of first level project features determined by precise questions with closed answers.
9. Esurance that dependency is highlighted by chartering the cause and effects of every risk.
10. Definition of the risk assessment survey with the identified filter that has the potential to disclose:
    a. What is the level of knowledge of the respondent about specific risks, which can lead to a deeper research plan if too many respondents do not know what to answer.

b. What is the level of agreement of the respondent about specific risks, which can lead to a dedicated workshop if there are too many differences between closed answers like *Yes* and *No*.

11. Evaluation of the risk level of the project throughout scoring.
12. Inclusion of weights and scores into the questionnaire.
13. Evaluation of the survey results from diverse source to identify all sub-classes that are represented and calculate the total score.

These selected surveys can generate a wide range of risk sub-classes, their scores, and the overall project score. The high scoring classes and sub-classes of risks can indicate a high degree of uncertainty due to specific and individual knowledge gaps. The upper limit of the risk classes and overall score convey possible worst-case project risks, but it is only a specific individual opinion. The outcome of this exercise will form a basis not only for the current project planning activity, but also for future projects and risk assessments within the organization (Ackermann, Eden, Williams, & Howick, 2007).

4.4. Findings

This exploratory case study aims to provide recommendations extracted from the research on *Systemic Risk assessment: a case study* for identifying the Risk Filter applicability to the future projects underlying the *Digital strategy of the education system in Romania*. Risk registers are being used extensively by many organizations in different fields and are seen as an integral part of the risk assessment process (Henschel, Florio, Jharni, & Stellmacher,2022).

In this specific case of the *Digital strategy of the education system in Romania* the first consideration of a project definition and its risk assessment should occur at the strategic planning stage, in order to increase the rate of reaching all strategic objectives and goals, at EU and country level. All the steps required to define and develop the Risk Filter are feasible and applicable to the use case of the *Digital strategy of the education system in Romania.*

However, while looking for the Risk Filter, other needs can be identified, such as the requirement for a structured workshop, usage of the filter while projects are underway and the necessity of a form of knowledge repository. The Risk Filter is important in relation to the *Digital strategy of the education system in Romania* because the initial use of the Risk Filter will

provoke significant output, firstly from extending the risk sub-classes and secondly the compilation of the survey responses. The outcome of applying the Risk Filter to the strategic planning of the future projects could be a very well documented risk response planning, with strong mitigation strategies, preventive plans, and contingency plans.

5. Conclusions

As many other case studies, our research could be accused also of lack of rigor or that it has allowed equivocal evidence or biased views to influence the direction of the findings and conclusions. Also, it provides very little basis for scientific generalisation since we conducted the research using a method dependent on a single case exploration, making it difficult to reach a generalizing conclusion. Nevertheless, this exploratory case study over the risk filter applicability to the digital strategy of the education system in Romania intended only to match the recommendations extracted from the research on *Systemic Risk assessment: a case study* for identifying the Risk Filter applicable to the future projects underlying the Digital strategy of the education system in Romania.

The utility of this method can be used to build stronger and more rigorous research in the field of digital strategy planning and risk assessment and develop action portfolios to be used between different fields while identifying systemic risks in complex environments. This information could assist the decision-making process and suggest real areas for improvements, mitigation, or further investigation (Haimes, 2005). Moreover, advancing the research in the field of strategic planning and risk management in relation to governmental strategies can define a clear difference between aleatory uncertainties due to probabilistic variability (Oakes, 1986) and epistemic risks caused by knowledge gaps (Sahlin, & Persson, 1994), and can develop new models of actions and frameworks for future research.

At the European policy level, the European Commission Communication on the Digital Education Action Plan (European Commission, 2018) of January 2018 defines digital competence as *the confident, critical, and responsible use of digital technologies, as well as their use for learning, at workplace and for participation in society*. In 2021, the European Commission President stated that the:

> *Education and training system is increasingly part of the digital transformation and can harness its benefits and opportunities. However, it also needs to effectively manage the risks of the digital transformation, including the risk of an urban/rural digital divide where certain people can benefit more than others. The digital transformation in education is being driven by advances in connectivity; the widespread use of devices and digital applications; the need for individual flexibility and the ever-increasing demand for digital skills. The COVID-19 crisis, which has heavily impacted education and training, has accelerated the change and provided a learning experience.* (European Commission, 2021).

The Romanian Digital Strategy for Education should focus on encouraging, supporting, and increasing the conscious use of digital and innovative educational practices, the first two priorities being: better use of digital technology for teaching and learning and the development of digital skills and competencies relevant to digital transformation.

The establishment of public policies as part of the strategic planning should be based on a mix of tools, like: analysis of the normative framework – European and national, study of existing research on the integration of technologies in education, realization of focus groups, conducting in-depth interviews with Romanian experts in education, using a national questionnaire to survey the opinion of teachers and parents, monitoring the media to identify trends in the presentation of technology integration in education, identifying good practices.

The digitalization of the Romanian educational system should be planned with a well-established vision (what) and strategy and an action plan (how), harmonized from one minister to another, with purchases of digital educational content and equipment in the presence of impact analysis and streamlining national efforts, at the ministry level, with regional ones, at the level of town halls and prefectures. The new politics regarding the situation of the integration of technologies in education in Romania should take in consideration and mitigate the main problems that prevent an advanced and effective digitization of the field: educational resources suitable for technology-based teaching-learning processes, training teachers to understand and effectively use technology in the classroom, the need of basic infrastructure needed for technology-based educational processes, and content and pedagogical practices adapted to technology-based education.

Moreover, IT and agility are critical factors that can improve education performance, especially during situations like the COVID-19 pandemic, when almost all educational activities had been conducted online. Therefore, the policymakers must emphasize the importance of effective IT governance practices and the maximum IT improvements that can be delivered fast (Tahar, Sofyani, Nur Arisanti, Ayu Amalia, 2022). The COVID 19 pandemic has restarted the way economic activities are perceived. In the context of economic bottlenecks and social distancing measures, the economic environment has been practically forced to take the step towards digitizing activity. The COVID-19 pandemic has also demonstrated the need to "accelerate public sector digitization in all priority areas like health and education. In this context, by changing the economic paradigms, Romania has the unexpected chance to burn the stages and to grow economically significantly, through technology and digitalization.

The country-specific recommendations of the EU identify the need for investment to capitalize on the benefits of digitalisation for citizens, in both the private sector and public administration. It is recommended to increase e-government measures, including by introducing and strengthening interoperable services at European level and increasing digital skills levels. Technology and innovation have proven to be key to everyone's survival and success, and the crisis has been forcing digital, telecommuting and e-commerce delays to recover overnight. Romania has a unique opportunity to sprint the short-term and long-term digital programs, that should not miss.

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