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The Era of Business Intelligence Tools

In today's world, business data has become an invaluable asset for companies of all sizes and industries and their importance is only expected to grow in the coming years as companies continue to rely on data-driven insights to gain a competitive edge in the marketplace.

Applications for business data have evolved significantly over the past few decades. In the early days of computing, businesses used mainframe computers and custom-built software applications to manage their data. As computing technology evolved and became more affordable, smaller businesses began adopting computer-based systems to manage their data.

Today, the landscape of applications for business data is diverse and constantly evolving as they are being used by organizations worldwide to make informed decisions, improve efficiency and gain a competitive edge. These applications include data analytics, business intelligence, machine learning, predictive modeling, data visualization, and data management. Businesses of all sizes and industries use a variety of applications to manage their data, including Customer Relationship Management (CRM) systems, Enterprise Resource Planning (ERP) software, Business Intelligence (BI) tools, and data analytics platforms. Business data is being used to analyze customer behavior, optimize supply chain management, automate processes, personalize marketing efforts, and more. Additionally, data analysis can help identify areas for improvement and optimize business processes, ultimately leading to increased efficiency and cost savings. With the explosion of data, the demand for professionals skilled in data analysis and management is growing rapidly across all industries.

According to a report by Grand View Research, the global market for business intelligence and analytics software is expected to reach $55.48 billion by 2028, growing at a CAGR (The Compound Annual Growth Rate) of 9.5% from 2021 to 2028. The use of business applications for data analysis is prevalent across many industries. According to the same survey by consulting company Gartner, the industries with the highest adoption rates of business intelligence and analytics tools in 2021 are healthcare (54%), manufacturing (51%), and retail (49%). Additionally, a report by Zion Market Research found that the financial services sector is expected to be the largest user of business intelligence and analytics software, followed by healthcare and telecom & IT.

It is important for researchers to study the applications of business data because it provides insights into the latest trends and innovations in the field of data analysis and management. By studying how companies are using data to make strategic decisions, researchers can identify new approaches and techniques that can be used to improve business practices and drive growth. Additionally, research on applications

„Torture the data,
and it will confess
to anything."
Ronald Coase

for business data can help identify areas where businesses may be falling behind in their use of data, and guide how to catch up with competitors. This is particularly important in today's data-driven economy, where companies that are slow to adopt data-driven practices risk falling behind their competitors.

Furthermore, research on business data applications can help shed light on the impact of data-driven decision-making on a company's bottom line. By analyzing how companies use data to drive revenue growth, reduce costs, and improve customer satisfaction, researchers can help demonstrate the value of data-driven practices to business leaders and encourage wider adoption of these practices across the industry.

„Hiding within those mounds of data is knowledge that could change the world."
Atul Butte
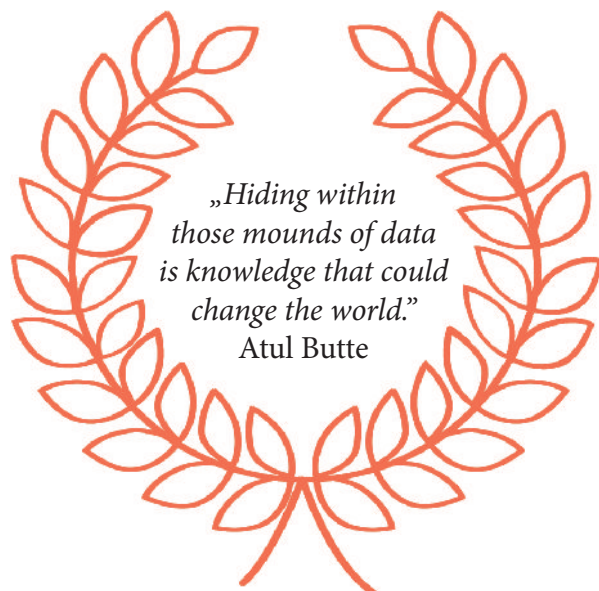
Overall, the increasing adoption of business applications for data analysis highlights the importance of leveraging data to make informed business decisions. With the growth of the global business intelligence and analytics software market and the prevalence of usage across various industries, it is clear that businesses are recognizing the value of using data to drive success.

The changes taking place in business tools require changes in the management of companies. The focus must be on the flexibility of production and people, to follow the flexibility of demand.

Mirona Ana Maria Popescu
Senior Editor

Digitization of Public Services

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Abstract

With the development of technology and the rising desire for more effective, accessible, and affordable government services, the digitization of public services has become a common trend in recent years. The goal of this paper is to present an overview of Romania's public service digitalization, including its current state, difficulties, and prospective effects on people, governments, and society. In this regard, the authors analysed the United Nations study on the efficiency of electronic government at the international level, the Study carried out by the European Commission on the digital performance of European Union countries, the IMD World Study on digital competitiveness, the National Recovery and Resilience Plan of Romania, and the National Catalog of Public Services. The digitization of government services in Romania has accelerated recently as a result of the nation's initiatives to modernize its public sector, boost transparency, and enhance the effectiveness of public services. However, Romania still faces many barriers to the adoption and use of public services, and this digitalization approach has to be promoted and adopted not only by the government but also by companies and citizens.

Keywords: digitalization, public services, digital competitiveness, digital connectivity

Introduction

We live in an era of speed, technology, and information, an era in which change is at every step. Both people and companies must keep up with these changes to be able to reach their goals more easily. Digitization is one of the solutions that come to the support of humanity to be able to make our lives easier, the digitization of the „new economy, societies and cultures" being one of the basic characteristics of the contemporary era (Castells, 2010).

The term „digitization" was first used in a 1971 essay published in the North American Review. In this paper, Robert Wachal discusses the social implications of the „digitization of society", emphasizing computer-assisted humanities research

„The value of an idea lies in the using of it."
Thomas Edison
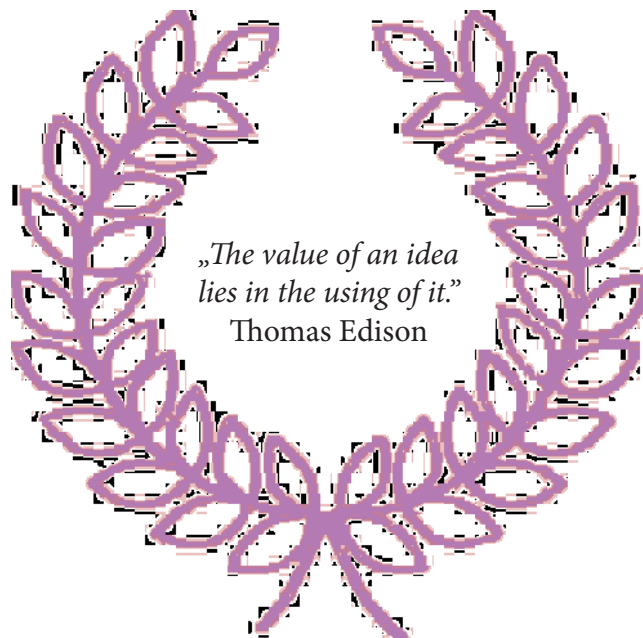
(Wachal, 1971). Regarding the definition of the concept, digitization refers to the process of transforming physical operations, objects and processes into digital format, so that they can be carried out through digital supports.

The European Parliament (2022) also supports the fact that digitization refers to the integration of digital technologies by organizations, as well as the impact of these technologies on society. Digitization becomes the process of transforming conventional operations and processes in an organization through the use of digital technologies. This transition has been supported by both existing technological improvements and the growing demand for more efficient corporate practices.

Digitization has significantly affected most fields, including those related to finance, healthcare or retail. The emergence of digitization in the financial sector has helped to increase the speed and efficiency of transactions that were carried out with the help of digital payment systems. Digitalization has also contributed to increasing personal comfort, with people being able to make online purchases at any time of the day or night, from any place, without being restricted by time or distance.

Despite the advantages offered, digitization also comes with difficulties. One of the most pressing problems associated with digitization concerns information security. The creation of secure technological infrastructures, which can face cyber-attacks and prevent the flow of information, becomes a constant concern of economic agents who want to involve digitization in the basic activities of companies (Abolhassan, 2017). In addition, the high cost of investments represents another important barrier when it comes to investments in digital technologies (Amankwah-Amoah *et al.* 2021). Along with this problem, economic agents are also faced with finding personnel with the right skills, improving skills or retraining to be able to add value within digitalized organizations (Branca *et al.*, 2020).

Research Methodology

This study is bibliographic research, which has the role of presenting the current state of digitalization of public services in Romania. In this regard, the authors started the study with the analysis of concepts related to digitalization and the digitalization of public services. The second stage consisted of the analysis of three international studies that present the situation of the digitization of public services, the focus being on the Romanian public services (the United Nation study on the efficiency of electronic government at the international level, the Study carried out by the European Commission on the digital performance of European Union countries, the IMD World Study on digital competitiveness). The third stage consisted of the analysis of the National Recovery and Resilience Plan of Romania,

with emphasis on the digital competitiveness component. The last stage consisted of the analysis of the National Catalog of Public Services and the situations collected by the Authority for the Digitization of Romania regarding the digitization of public services.

Results and Discussions

The situation of digitization in Romania. Digitization is a subject of great interest to society and researchers. The degree of digitization of countries is analyzed in several types of studies at the international level. Among these, the most important are:

- The United Nations' study – which measures the efficiency of electronic government at the international level, based on the analysis of a composite index ("EGDI");

- The study carried out by the European Commission – which measures the digital performance of the European Union countries, based on the analysis of a composite index of the digital economy and society ("DESI");

- The IMD World's study – which measures the digital competitiveness of 63 economies, based on the analysis of a composite index targeting three dimensions: knowledge of the digital transformation of the economy, the technological factor and the capacity to absorb digital technologies.

The United Nations study

The composite indicator used to measure the effectiveness of e-government in the provision of public services is the EGDI indicator (E-Government Development Index). This indicator is obtained based on the weighted average of the Telecommunications Infrastructure Index (TII), Human Capital Index (HCI), and Online Services Index (OSI) (PC, 2018).

In the year 2022, Romania is in position 57 out of 193 countries, with an e-government development index of 0.7619. Romania also occupies a similar position (54th out of 193) from the point of view of the electronic participation index. The evolution of the EGDI indicator for Romania, 2003-2022, is presented in Table 1.

Table 1 – *The evolution of the EGDI indicator for Romania, 2003-2022*

2022 Romania	2022	2020	2018	2016	2014	2012	2010	2008	2005	2004	2003
EGDI – Position	57	55	67	75	64	62	47	51	44	38	50
EGDI – Value	0.76	0.76	0.66	0.56	0.56	0.60	0.54	0.53	0.57	0.55	0.48
OSI – Value	0.68	0.72	0.65	0.45	0.44	0.51	0.41	0.41	0.64	0.60	0.41
TII – Value	0.79	0.75	0.54	0.45	0.43	0.42	0.30	0.29	0.18	0.16	0.14
HCI – Value	0.80	0.79	0.79	0.77	0.81	0.87	0.92	0.90	0.88	0.88	0.88

(Source: adapted from UN, 2022)

Analyzing the countries of the European Union (United Nations, 2022), the ranking is led by Denmark (0.97), Finland (0.95), Iceland (0.94), Sweden (0.94), Estonia (0.93), while Romania is in last place (0.76). This poor position of Romania can be explained by the fact that in this country there is a low level of digital education, and most Romanians use the Internet in particular to access social and entertainment networks (PC, 2018). Moreover, from the point of view of broadband internet technological infrastructure, in Romania, there is a large gap between urban and rural areas, with only 40% coverage in rural areas (PC, 2018).

The study was carried out by the European Commission. The composite indicator used to measure the digital performance of European Union countries is the DESI indicator

(Digital Economy and Society Index). This indicator is obtained based on the analysis of the following dimensions (EC, 2022):

• Connectivity (Fixed Broadband Services, Mobile Broadband Services and Prices)

• Human capital (Internet use, basic and advanced digital skills)

• Internet use (Citizens' use of online content, communications and transactions)

• Integration of digital technology (Digitization of companies and e-commerce)

• Digital public services (e-government and e-health).

In Figure 1, you can see the ranking for the year 2022 in terms of the DESI index.
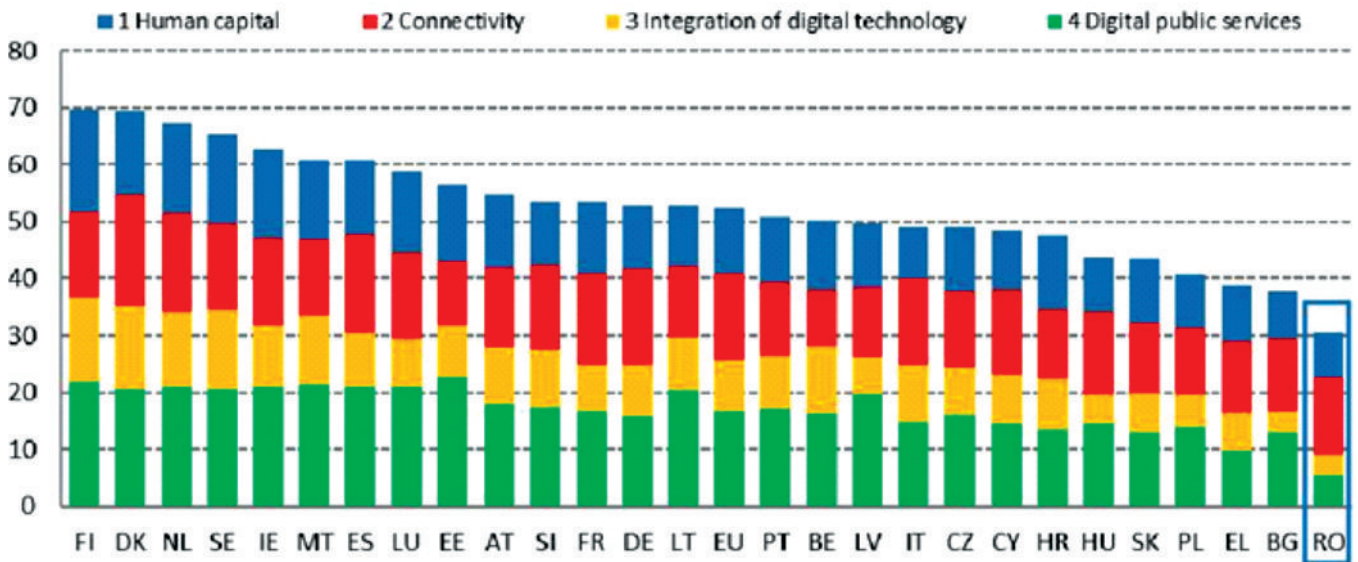
Figure 1 – *DESI index for European Union countries, 2022*
(Source: EC, 2022)

Analyzing the value of the DESI indicator, it is found that Romania ranks last (27 out of 27), failing to improve its indicator value as much as the neighbouring countries. The European Union's report on this DESI indicator highlights the fact that in Romania there is

still a low level of digital skills compared to the average recorded by the European Union, with the integration of digital technologies and digital public services being one of the main problems facing Romania. Moreover, the situation of SMEs regarding digitization

places Romania at the last place in the European Union, with only 17% of companies carrying out electronic exchanges of information and only 22% of companies having at least a basic level of digital intensity (EC, 2022).

The IMD World's Study – World Ranking of Digital Competitiveness. The IMD World study is a study that presents the global ranking of digital competitiveness, based on the analysis of 63 economies and three dimensions: knowledge of digital transformation in the economy; the technological factor; absorption capacity of digital technologies.

In 2022, the first place was occupied by Denmark, followed by the United States of America, Sweden, Singapore, and Switzerland, while Romania was in 49th place out of 63, the evolution of its position in the analyzed ranking being visible in Figure 2.
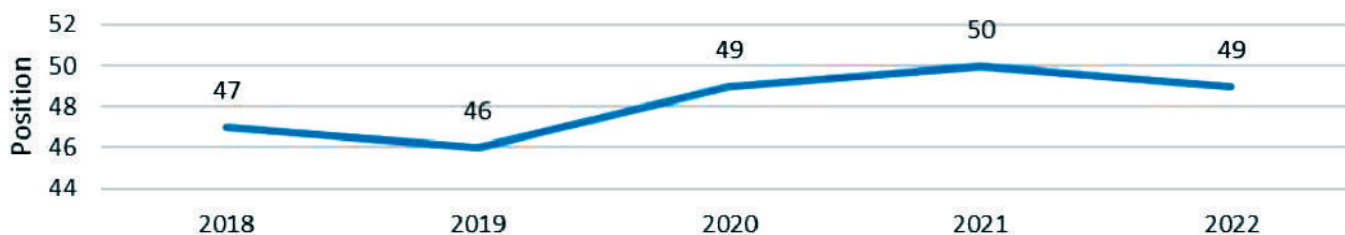
Figure 2 – *The evolution of Romania's position in the World Digital Competitiveness Ranking, 2018-2022*
(Source: adapted from IMD, 2023)

From the point of view of the dimensions analyzed, in 2022 Romania occupies the 49th position for the dimension of knowledge for the digital transformation in the economy, the 48th place for the dimension related to the technological factor, and the 51st place for the dimension related to the absorption capacity of digital technologies.

The situation of digitalization of public services in Romania. Both the COVID-19 pandemic and the frequent changes in government contribute significantly to the digitization process of public services (EC, 2023). On a national level, Romania aims to address the issue of digitization, adopting this topic in the National Recovery and Resilience Plan, which is based on six main pillars (GR, 2021): the green transition; digital transformation; smart, sustainable and inclusive growth; social and territorial cohesion; economic, social and institutional health and resilience; policies for the new generation.

Thus, digital transformation is a basic component of the National Recovery and Resilience Plan, which aims to create a coherent and integrated digital infrastructure at the level of public administration in Romania, an infrastructure capable of offering high-quality digital services both among citizens and among companies (GR, 2021). In addition, the measures described in this plan aim to increase the level of adoption of digital technologies in all sectors of activity and within all state institutions, so that, through digitization, the government can help as many citizens and companies as possible.

The National Recovery and Resilience Plan (PNRR) highlights the fact that the digitization of the public services sector in Romania is still below the average recorded in the European Union, but important steps are being taken to overcome this blockage (Table 2).

Table 2 – *Reforms proposed regarding the digital transformation*

Direction	Reform	Investment
Digitization of public services	Development of a unified framework for defining the architecture of a government cloud system	Implementation of government cloud infrastructure
		Investments for cloud development/migration
		Realization of the eHealth and telemedicine system
		Digitization of the judicial system
		Digitization in the field of environment
		Digitization in the field of work and social protection
		Implementation of eForms electronic forms in the field of public procurement
		Electronic identity card and qualified digital signature
		Digitization of the sector of non-governmental organizations
		Digital transformation in public service management
		Digital transformation and adoption of work process automation technology in public administration
Cyber security	Ensuring the cyber security of public and private entities that own critical infrastructures	Ensuring cyber protection for both public and private ICT infrastructures critical to national security through the use of smart technologies
		Development of security systems for government spectrum protection
		Increasing the resilience and cyber security of infrastructure services of Internet service providers for public authorities in Romania
		Creating new cybersecurity skills for society and the economy
Digital competencies, human capital and the use of the Internet	Increasing digital competencies for the exercise of public office and lifelong digital education for citizens	Advanced digital skills training program for civil servants
		Funding schemes for libraries to become digital skills development hubs
		Schemes dedicated to the improvement/retraining of company employees
Digital connectivity	The transition towards reaching the EU-2025 connectivity objectives and the stimulation of private investments for the development of very high-capacity networks	Implementation of a scheme to support the use of communication services through different types of tools for beneficiaries, with a focus on white areas

(Source: adapted from GR, 2021)

To a large extent, the difficulties are represented both by ensuring the security of networks and managing cyber risks, as well as by broadband coverage of rural areas or improving the digital skills of citizens. In this sense, regarding digitalization, four (4) important directions are pursued through the PNRR (GR, 2021): digitization of public services; cyber security; digital skills, human capital and the use of the internet; digital connectivity. To deal with these directions, specific reforms are proposed, each of which also has several proposed investments that must be made to achieve the established objectives (Table 2).

The adoption of digitalization solutions on a large scale can contribute not only to the elimination of bureaucratic barriers but also to increasing the degree of transparency of the activities and actions carried out by the state authorities, as well as to the achievement of sustainable development objectives.

At the European level, there are five degrees of sophistication of electronic services (MIS, 2015): information; interaction; bidirectional interaction; trading; personalization. The status of digitized or partially digitized public service is given to that service that has at least level 1 sophistication (MIS, 2015).

Regarding the digitalization of public services in Romania, in 2022 there were 2333 public services provided by central public administration institutions, which were analyzed by the Authority for Digitization of Romania (Figure 3).
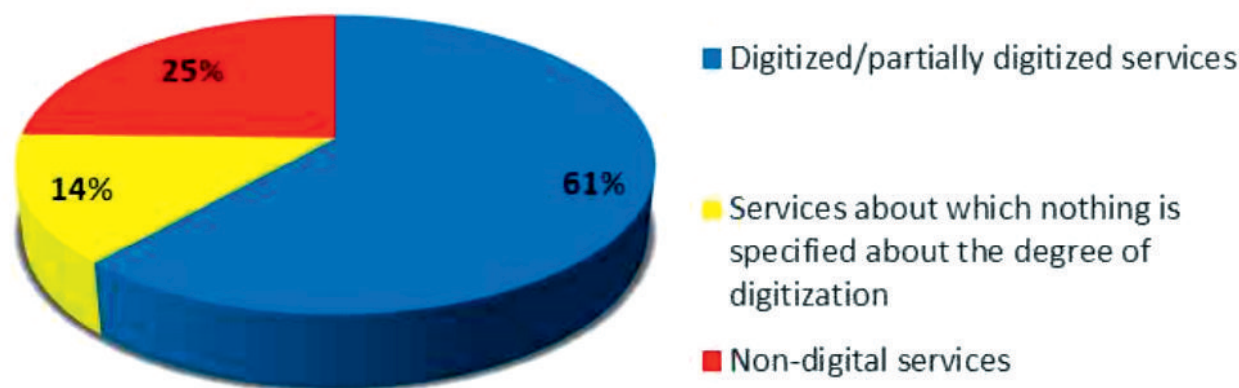
Figure 3 – *The situation of digitalization of public services in Romania, 2022*
(Source: adapted from MIS, 2015)

Of these, only 61% are digitized or partially digitized, 25% are not digitized, while about 14% nothing is specified regarding the degree of digitization. Moreover, 260 institutions under the authority of the central institutions completed the forms related to public services, contributing to the improvement of the national digitization level.

Regarding the most accessed digitized or non-digitized public services, in 2022 it is found that most of the citizens' access digitized public services to get information, obtain various information extracts or authentication, various documents from the archive, make registration procedures in the land register, to see what traffic violations they have and to pay the penalties related to these violations, to obtain information from the Trade Register, the criminal record certificate, the cadastral documents, to check the desired combination of the number

registration and vehicle registration, as well as to issue or obtain a driver's license (ADR, 2023).

From the point of view of the beneficiaries of digitized services, both natural and legal persons can enjoy the steps taken in the sense of digitization by state institutions. Thus, 26% of the beneficiaries of digitized services are individuals, 24% are legal entities, and 50% of services are intended for both categories (ADR, 2023).

Among digitized services, most are paid (61%), while 39% are free. Regarding the services with a fee, the method of payment of these fees can be seen in Figure 4.
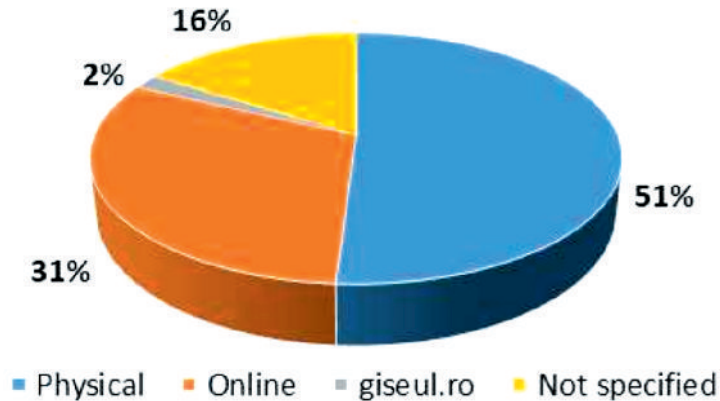
Figure 4 – *Tax payment methods, 2022*
(Source: adapted from ADR 2023)

According to the Authority for the Digitization of Romania (2023), although services can be paid online, the majority of citizens still prefer to pay physically (51%), 31% of them paying online and only 2% through the ghiseul.ro platform.

From the point of view of digital services (Figure 5), 82% of them are commercial, while the rest are non-commercial (ADR 2023).

From the point of view of the institutions that have taken steps towards digitalization, 21 such institutions appear in the catalogue that lists the services offered to citizens and companies with 250 fully digitized services. Among them, the Ministry of Transport and Infrastructure has the most services completed (37), followed by the Ministry of Education (36), the Ministry of National Defense (33),
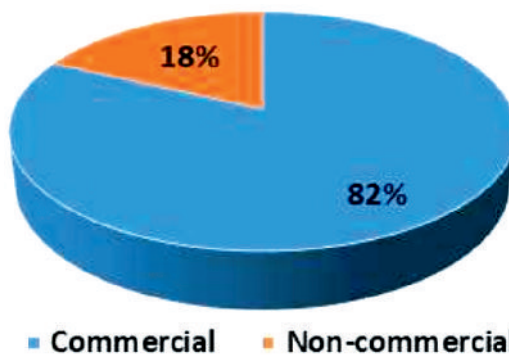
Figure 5 – *Types of digital public services, 2022*
(Source: adapted from ADR, 2023)

the Ministry of Youth and Sports (25) and the Ministry of Research, Innovation and Digitalization (20).

All the efforts of the institutions to be present in this catalogue that lists the services offered to citizens and compabureaucratizationd by creating an instrument that becomes essential for the governmental measures and actions that must be carried out to ensure digital transformation and reduce the bureaucratization from administration.

In recent years, the digitization of public services has been an important objective to achieve digital transformation at the national level. By creating online platforms, the Romanian government has started to take important steps to create transparent and reliable links with citizens and companies. However, although work is being done on several levels to develop a secure digital infrastructure, guarantee access to this infrastructure, as well as to develop the digital skills of citizens, the adoption of digital solutions is still slow. This situation highlights the need for additional research to determine which are the main factors that influence the adoption of digital technologies in the Romanian public services sector.

Conclusions

The government of Romania has made the digitalization of public services a top priority. It has introduced several programs to encourage the use of digital technology in several public administration sectors, including healthcare, education, and public safety. Among these projects are the creation of online portals and platforms, the use of electronic signature and identification technologies, and the adoption of frameworks and standards for e-governance.

Despite these initiatives, Romania's public service digitalization still faces several obstacles, including the country's uneven distribution of digital infrastructure and expertise, the requirement for data security and privacy, and the difficulty of integrating various digital platforms and systems across various public sector organizations. Nonetheless, the digitalization of public services in Romania has the potential to offer citizens several important advantages, including better access to services, shorter wait times, and more accountability and transparency in the provision of public services. Also, the change to digitalization has the potential to boost Romania's digital economy's innovation and economic growth as well as its competitiveness abroad.

Overall, Romania's public sector modernization and provision of citizens with more effective, accessible, and citizen-centric government services that match their changing needs and expectations in the digital age are made possible by the digitalization of public services.
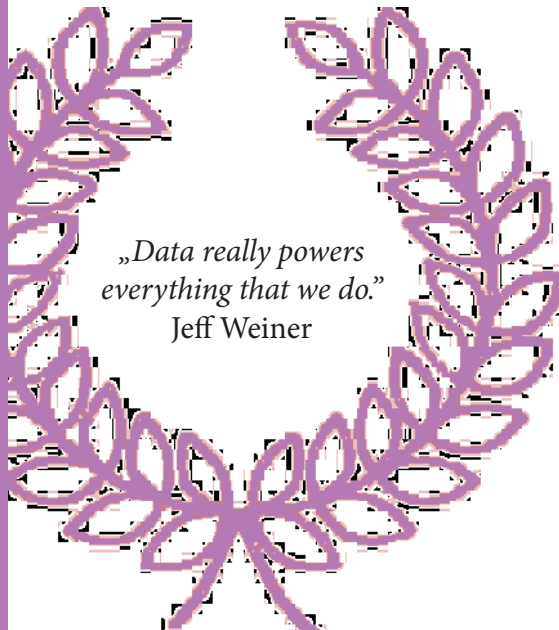
Acknowledgements

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„*Data really powers everything that we do.*"
Jeff Weiner

Data Analysis for Quality 4.0

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Industry 4.0 generates massive amounts of data known as big data. Industry 4.0 and big data will have a direct impact on an organization's quality-related business data and the business applications used to analyze the data. However, the majority of the available literature on Quality 4.0, the quality-related side of Industry 4.0, pertains to Quality 4.0 and organizations and 4.0. This paper seeks to understand organizational workforce readiness for the analysis of Industry 4.0 quality-related data by assessing Quality 4.0-related keywords in a quality practitioner journal. The identified keywords were clustered into related categories and the categories were analyzed using a Chi-square Goodness of Fit test to determine if there was a statistically significant difference in the number of occurrences of the keyword terms. This research has found that career-related aspects of Quality 4.0 are a common topic in the practitioner literature and this research can serve as a basis for further research, such as a survey of quality practitioners in the industry. Furthermore, this research has found that up-skilling of the workforce will be needed for Quality 4.0 so that organizations can properly use the business applications needed to analyze Industry 4.0-driven business data.

Keywords: Big Data, Workforce Development, Quality 4.0.

Introduction

The digitalization of industry has led to the Fourth Industrial Revolution, known as Industry 4.0 (Machado *et al.*, 2020). The integration of smart networked machines capable of decision-making and communication through IoT (Internet of Things) is viewed as CPS (Cyber-Physical Systems) is a key part of Industry 4.0 (Nounou *et al.*, 2022), which is being implemented in some organizations to maintain a competitive advantage and in other organizations to gain a competitive advantage

„Information is the lifeblood of business."
Michael Dell

(Saabye *et al.*, 2022). Industry 4.0 presents a „disruptive transformation" (Wagire *et al.*, 2021, p. 603) confronting organizations with technological challenges (Rocha *et al.*, 2019), heavily changing current business models (Götz and Jankowska, 2017), and necessitating changes in the functioning and structure of organizations (Robert *et al.*, 2022).

Quality 4.0 is much less thoroughly researched than other Industry 4.0 topics such as manufacturing and agriculture. Furthermore, much of the available literature on Quality 4.0 is focused on topics such as defining Quality 4.0 (Dader *et al.*, 2021). Quality 4.0 is not just a topic in the academic research domain. The topic is also addressed in online magazines, blogs and by ASQ (American Society for Quality) (Sader *et al.*, 2021). However, much of the research into Quality 4.0 pertains to topics such as the integration of quality management and Industry 4.0 (Glogovac *et al.*, 2022), and frameworks for Quality 4.0 (Shivam and Gupta, 2022).

There is little research into the quality practitioner's perspective on adaptation to Quality 4.0. This paper seeks to fill the gap by analyzing the keywords used in Quality 4.0-related articles in the practitioner journal Quality Progress. Quality Progress has been a publication for quality practitioners since 1968 and was created when the magazine Industrial Quality Control transitioned into two separate publications; the practitioner journal Quality Progress and the research journal Journal of Quality Technology (ReVelle, 2017).

Literature Review

The close alignment of traditional quality methods and Industry 4.0 has led to the term Quality 4.0 to describe the integration of quality and technological advances in the industry

(Sony *et al.*, 2020). Industry 4.0 will have a major impact on quality improvement methodologies (Vinodh *et al.*, 2021). Industry 4.0 concepts and technology with a direct impact on Quality 4.0 include enabling technologies, big data, AI (Artificial Intelligence), deep learning, machine learning, and data science. Enabling technologies to consist of sensors which permit real-time sampling and communication between systems through IoT and 5G networks. These technologies will generate large data sets known as big data, which can be analyzed with AI to detect problems before they happen and deep learning, which can identify failures through images. The analysis and use of big data are referred to as data science (Shivam and Gupta, 2022).

Quality 4.0 follows from Quality 3.0, which was the era where ISO 9000 and Six Sigma were intruded and the emphasis shifted from inspection to organization-wide quality improvement and problem-solving (Chiarini and

Kumar, 2021). Sony *et al.* (2020) identified eight key ingredients for the successful implementation of Quality 4.0, which include successful handling of big data in quality of design, conformance, and performance as well as prescriptive analytics in the planning, improvement, and control of quality. In addition, top management support and training were identified as essential for the implementation of Quality 4.0.

Zonnenshain and Kennet (2020) present a framework for Quality 4.0 and state that quality professionals must either support data scientists, or organizations must integrate the data science role into a quality function. A different framework for Quality 4.0 is provided by Shivam and Gupta (2022), with the automation of inspection and decision-making to reduce delays, time, and costs. A lean-based architecture for Industry 4.0 is described by Nounou *et al.* (2022) and Albukhitan (2020) recommends the use of a digitalization transition plan in organizations.

Although technological readiness is the most important factor for implementing Industry 4.0 technologies, soft factors such as the organization's culture and the adaptability of employees are still critical (Antony, 2021) and the successful implementation of Industry 4.0 technologies heavily depend upon the skills and knowledge of employees in supporting roles (Corò *et al.*, 2021).

Babatunde (2021) investigated both hard and soft quality skills needed for Industry 4.0 and found relevant hard skills to include analysis and evaluation of systems, creativity, troubleshooting, critical thinking, analytical thinking, programming, and the installation, maintenance of monitoring and control of technology. Soft skills included emotional intelligence, physical endurance and dexterity, and memory and verbal abilities.

The skills needed by quality professionals in Quality 4.0 was investigated by Sumitha *et al.* (2021) who conducted a survey of quality professionals in Malaysia and interviewed decision-makers to determine that new skill such as data mining and the use of technology such as smart glasses will be needed as well as the ability to analyze large amounts of data and solve complex problems with new tools.

Escobar *et al.* (2021) provide potential certification curricula for Six Sigma Green Belts, Black Belts, and Master Black Belts in a Quality 4.0 environment with all certification levels being capable of writing code and understanding big data analytics. Adaptation for Six Sigma for a big data environment has also been proposed by Koppel and Chang (2021), Chiarini and Kumar (2021), Tissir *et al.* (2022), and Ferrer (2021).

Závadská and Závadský (2018) investigated the current Quality 4.0 situation within organizations as well as the expectations of quality managers in regard to the implementation of Industry 4.0. The authors found that

the automotive industry was the farthest along in implementing new technologies and building trades lagged the most. The authors also found that quality managers anticipated the use of smart gloves and smart glasses for quality control and smartwatches for the management of non-conformities. Expanded use of RFID drones, autonomous vehicles, 3D printing, and simulation are also anticipated as well as QR codes replacing bar codes.

Methodology

An online database of quality journals (ASQ 2022) was searched with a filter to limit the results to the journal *Quality Progress* using the search term „Quality 4.0." A PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) approach was used (Siddaway *et al.*, 2019). The methodology based on PRISMA is depicted in Figure 1.
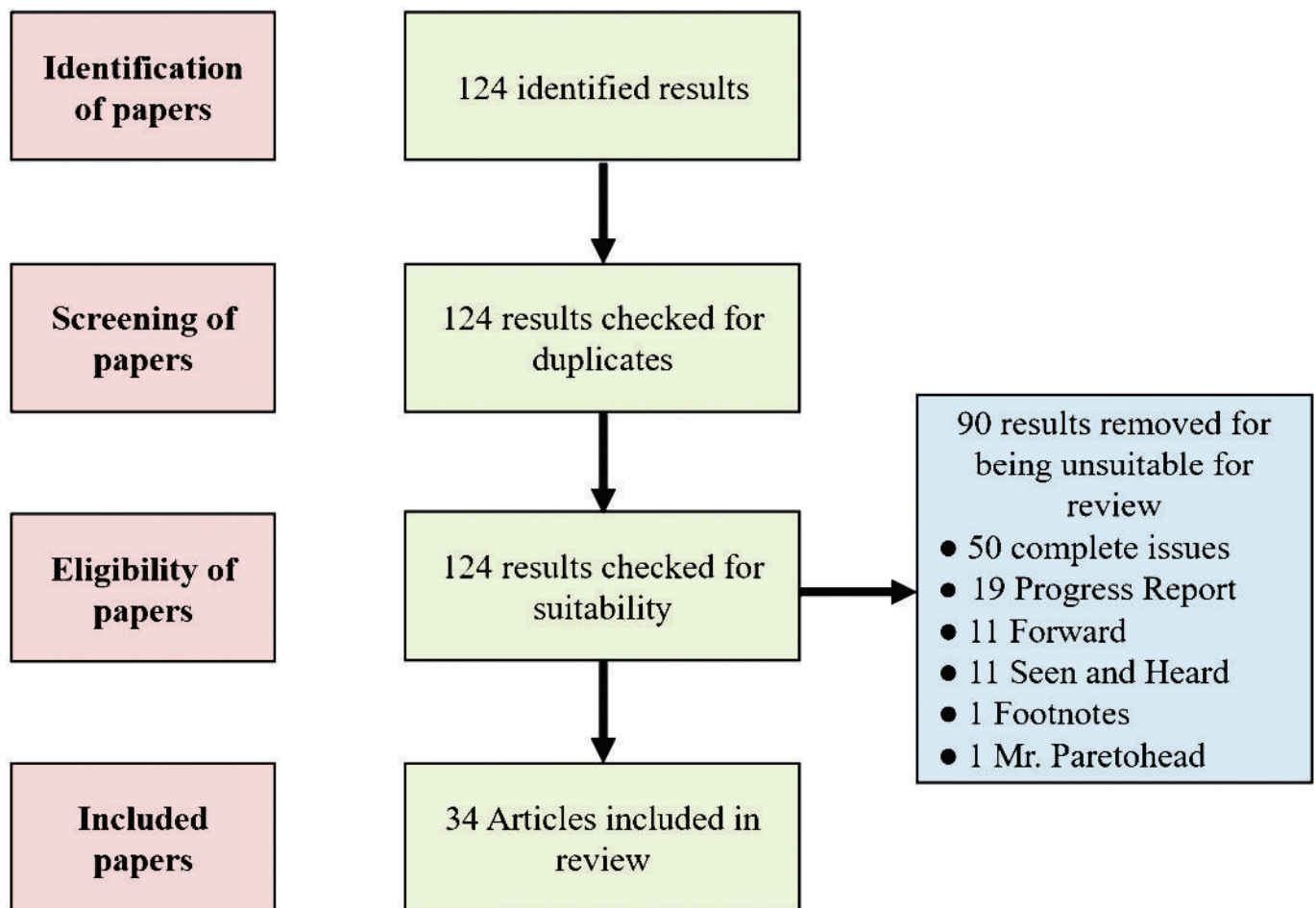
Figure 1 – *The methodology based on PRISMA*

The search resulted in 124 results. However, not all of the results were articles and not all of the articles pertained to Quality 4.0. Out of the 124 results, there were 50 results consisting of complete issues and 19 were from „Progress Report," which consists of news items written by the journal's staff. The editor's introduction was called „Forward" and occurred 11 times. There were also 11 occurrences of „Seen and Heard," which consists entirely of reader reactions. A book review column called „Footnotes" and a comic named

„Mr Paretohead" each occurred in the results one time.

The entire issue, „Progress, report," „Forward," „Sean and Heard," „Foot Notes," and „Mr Paretohead" were all removed from consideration in the study reducing the results to 37 articles. Not all results had Quality 4.0 in the keywords and those without were read to check for a mention of Quality 4.0 in the text. Three were removed due to failing to mention Quality 4.0 in the keywords or text, resulting in 34 articles or the study.

Results of Research

The identified articles were all published between 2017 and 2022. Table 1 shows the number of publications per year. The number of publications per year increased from 2017 until a peak in 2020 and decline from 2020 to 2021. There were fewer publications related to Quality 4.0 in 2022; however, only ten out of 12 months were represented in the data as the year was not over when the study was conducted.

Table 1 – *Quality 4.0 articles by year*

Year	2017	2018	2019	2020	2021	2022
Number of articles	1	3	7	10	9	4

The keywords found in the 34 identified articles are shown. There were 321 words identified, with many redundancies. However, there were exactly 176 keyword terms, consisting of one word such as „innovation" up to three words such as „standards and specifications" and one occurrence with three words and an abbreviation, which was „Internet of Things (IoT)". The most commonly occurring keyword terms were „Quality 4.0" (22 occurrences) and „Industry 4.0" (9 occurrences). There were only 24 different keyword terms that occurred two or more times in the results and there were 71 keyword terms that only occurred once in the results.

The keyword terms were grouped into clusters of related concepts. This was approached as an affinity diagram, which groups comparable ideas together and then selects one of the ideas as a heading to describe the grouped ideas (Koemtzi *et al.*, 2022).

After grouping, there were nine categories with one category used to group concepts that did not fit into any other category. Quality 4.0 was used to group all keyword terms related to Quality 4.0. There were many keyword terms related to traditional quality concepts and these were grouped under the heading Quality 3.0. Concepts about the careers for individuals were classified as career-related and statistics-related concepts were classified under statistics. There were also keywords terms related to product development, human resources, production, and supply chain. Table 2 depicts the clustered results with the number of occurrences for each keyword term shown in parenthesis.

Table 2 – *The three categories with the most content and number of occurrences*

Quality 4.0	Quality 3.0	Career
Quality 4.0 (22)	Quality improvement (5)	Career development (4)
Industry 4.0 (9)	Risk management (3)	Future of work (3)
Technology (7)	Voice of the customer (3)	Quality professionals (3)
Big data (6)	Cost of quality (2)	Re-skilling (2)
Data (4)	Process improvement (2)	Skills development (2)
Data quality (3)	Quality systems (2)	Career planning (1)
Digitalization (2)	Quality tools (2)	Careers (1)
Internet of Things (IoT) (2)	Change management (1)	Education (1)
Algorithm (1)	Continuous improvement (1)	Learning (1)
Applications (1)	Customer feedback (1)	Professionals (1)
Artificiel intelligence (1)	Customer satisfaction (1)	Quality skill set (1)
Automation (1)	Environmental management (1)	Skills (1)
Cluster analysis (1)	Industrial management (1)	Training (1)
Computation (1)	Leadership (1)	Workforce generations (1)
Connectivity (1)	Organizational structure (1)	
Data analytics (1)	People skills (1)	
Disruption (1)	Problem solving (1)	
Information management (1)	Quality (1)	
Internet of Things (1)	Quality awards (1)	
IoT (1)	Quality basics (1)	
Machine learning (1)	Quality engineering (1)	
Monitoring (1)	Quality fundamentals (1)	
Process reengineering (1)	Quality history (1)	
Remote working (1)	Quality planning (1)	
Risk management 4.0 (1)	Risk (1)	
Sociotechnical systems (1)	Standards and specifications (1)	
Transformation (1)	Surveys (1)	
	Sustainability (1)	
	Teams (1)	
	Value engineering (1)	

Statistics	Other	Product Development
Statistics (3)	COVID-19 (1)	Innovation (5)
Prediction (2)	Creativity (1)	Design quality (1)
Data analysis (1)	Critical thinking (1)	Product development (1)
Data collection (1)	Deep quality (1)	
Linear models (1)	Emotional intelligence (1)	
Regression models (1)	Research (1)	
Sample size (1)	Eight wastes (1)	
Significance tests (1)		
Statistical models (1)		

Human Resources	Production	Supply Chain
Employee engagement (1)	Machine (1)	Supply chain (2)
Great Resignation (1)	Production (1)	Procurement (1)
Human resources (1)	Manufacturing (1)	Purchasing (1)

A Chi-square Goodness of Fit test was used to determine if there was a statistically significant difference between the clustered keyword terms. The Chi-square Goodness of Fit test is used to determine if there is a statistically significant difference in the portions of occurrences between groups of data. The Chi-square Goodness of Fit test provides a p-value, which indicates a statistically significant difference exists if the resulting p-value is lower than the critical value of 0.05 (Barsalou and Smith, 2019). Table 3 shows the results of the Chi-square Goodness of Fit test. The p-value is 0.000, which is less than the critical value of 0.05; therefore, a statistically significant difference exists.

Table 3 – *Chi-square Goodness of Fit test results*

Category	Observed	Test proportion	Expected	Contribution to Chi-Square	N	DF	Chi-Sq	P-Value
Quality 4.0	73	0.111111	19.8889	141.827				
Quality 3.0	44	0.111111	19.8889	29.230				
Career	23	0.111111	19.8889	0.487				
Statistics	12	0.111111	19.8889	3.129				
Other	8	0.111111	19.8889	7.107				
Product development	7	0.111111	19.8889	8.353	179	8	228.514	0.000
Production	6	0.111111	19.8889	9.699				
Human resource	3	0.111111	19.8889	14.341				
Supply chain	3	0.111111	19.8889	14.341				

Both Quality 4.0 and Quality 3.0 showed up far more than would be anticipated if all things were equal. Career also showed up more than would be anticipated if all categories were equally represented. All other categories showed up less than would be anticipated if all categories occurred at an equal rate.

The strong contribution of Quality 4.0 to the Chi-square value can be observed, followed by Quality 3.0. Next are human resources, supply chain production, product development, other, and statistics, which contributed to the Chi-square value by occurring much less than would be anticipated if all categories occurred equally. Career occurred last due to occurring slightly more than would be anticipated, but still being close to the theoretical value that would result if all categories were equal.

Discussions

The number of articles that mention Quality 4.0 started with one in 2017 and peaked in 2020 and decreased to 2021. The reason for the decline is unclear and the number of occurrences is low; therefore, it would be premature to declare a downward trend.

Quality 4.0 was by far the most common keyword term. This was not unanticipated as the article search was specifically for papers related to Quality 4.0. Industry 4.0 came in at a distant second place with nine occurrences, which may be due to the relatedness of Industry 4.0 to Quality 4.0. The next two most common occurrences were technology with 7 occurrences and big data with 6 occurrences. This makes sense as both Quality 4.0 and Industry 4.0 are technology driven and generate big data.

The low number of occurrences for most keyword terms necessitated the use of clustering related concepts into groupings. Without clustering in groups, it would not have been possible to evaluate the many keywords and keyword terms with only one or two occurrences.

Some judgment calls were necessary for the classification of keywords. For example, data analytics could be listed as statistics or Quality 4.0 due to being frequently associated with big data, which is a part of Quality 4.0. Alternately, individual statistics-related concepts have relevance to big data but are frequently related to statistics and were therefore listed as a part of statistics.

Quality 4.0 was by far the most common concept, which could be anticipated as the search criteria were Quality 4.0. Traditional quality methods, classified as Quality 3.0, were the second most common concept. This could indicate that despite Quality 4.0 being on the horizon, quality practitioners are still concerned with their traditional quality methods.

The category career was in third place with 23 career-related occurrences. Industry 4.0 and Quality 4.0 will bring major changes to the industry and these changes could be disruptive changes that cost people their jobs. Search terms related to career included „career development" with four occurrences, and „future of work" with three occurrences. Both „re-skilling" and „skills development" had two occurrences each. Additional skill-related keyword terms with one occurrence each was „learning," „quality skill set," „skills," and „training."

There were a total of 12 occurrences related to statistics. This may be due to the applicability of statistics to Quality 4.0 through big data analytics such as statistical methods, although not necessarily the same statistical methods used in Quality 3.0. The remaining categories all had less than ten occurrences.

Conclusion

This paper reviewed the keywords used in a quality practitioner journal to identify the main quality-related concepts concerning the transition to Industry 4.0. The most commonly occurring concepts were Quality 4.0, which was the search word used, and concepts about Quality 3.0, such as quality improvement, risk management, and voice of the customer. The third most commonly occurring cluster of keywords pertains to careers, which may be an indication that quality practitioners are concerned about their careers as the field transitions into Industry 4.0.

Organizations need a transition plan for implementing Industry 4.0. New business applications will be needed for analyzing business data generated by Industry 4.0 and consideration must also be given to the upskilling of quality practitioners so that they can quickly adapt to the big data-rich Industry 4.0 environment. For example, the demand for data science skills is rapidly increasing in industry and it is an area where quality professionals would benefit from training. Integrating big data analytic skills into Six Sigma has been previously proposed and this could provide an option for training quality professionals in the big data analysis skills needed for using analysis-related business applications in Industry 4.0 for the analysis of quality-related business data.

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„The goal is to turn data into information, and information into insight."
Carly Fiorina

Consumer Behavior and Motivation

Dumitru Goldbach
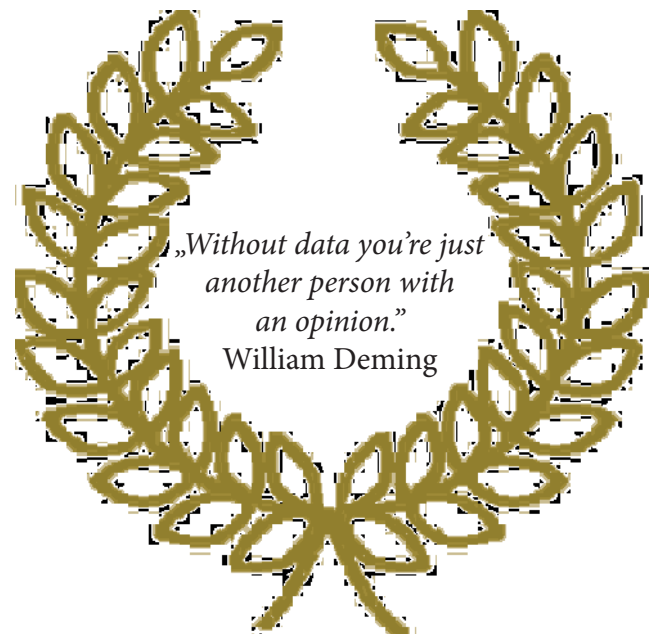
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Consumer buying behaviour is a dynamic area characterized not just by individuals' ever-changing needs, but also by the sum of the actions they take when choosing to buy a particular good or brand. Consumer motivation could be strongly connected to socio-economic, to one's own experience and memories, to education, but also the perception and attitude towards consumption trends. This paper expands on the concept of motivation in purchasing behavior and the degree of its influence on the decision-making process. Motivation has been defined as the satisfying of primary and higher needs to achieve the desired level of satisfaction. Lack of motivation can lead to a variety of bad experiences, such as a lack of information or access to information, a scarcity of resources, or an inability to adjust to changes in the external environment. Endogenous and exogenous variables can influence motivation, which can address utilitarian, aesthetic-emotional, social, or situational functions. In the suggested cognitive model, the current research addresses two major typologies of motivations: hedonistic, which is linked with a state of joy and pleasure, and utilitarian, which is associated with personal experiences, the quality-price ratio, and real consumption, among other things.

Keywords: consumer behavior, marketing, motivation, buying

Introduction

When we evaluate consumer behavior, we take into consideration that the condition of a state's economy is one of many components that might impact it. In other words, we are considering the presence of a variety of economic elements. As a result, citizens have enormous purchasing power in the case of a stable or robust economy, and income distribution leads to progress and prosperity. Simultaneously, the repercussions of a weak economy will be felt, leading to

„*Without data you're just another person with an opinion.*"
William Deming

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developmental challenges, low employment, rising bank and interest rates, and falling consumer trust in the state and private economic actors.

In this context, we suggest that, before making a purchase choice, the potential customer goes through a complicated psychological process in which he identifies and acknowledges the need. Furthermore, the individual assigns usefulness to the product or service through analytical and cognitive synthesis processes. In any event, we see that people like to be informed before making a purchase. In this regard, we realize that, along the information vector, any source may enhance the assessment process of the prospects and solutions available on the market that can meet their present needs. Other factors that impact purchasing motivation include the brand marketing strategy, the consumer's attitude and impression of a particular brand, and the brand's reputation. Other factors impacting purchasing motivation include the brand marketing strategy, the consumer's

attitude and opinion of a specific brand, the sales market, and the environment in which the economic entity expresses itself. Furthermore, we retain the role of knowledge on the degree of development of the economic entity or industry.

Motivation as a Psychological Key Concept

Motivation represents a very studied and used concept in various fields, such as economics, psychology, art, politics, religion, etc. It starts at the psychological level, and it is linked to primary needs such as nutrition and can tend to higher needs such as self-improvement or happiness. In this regard, motivation appears to be a real engine through which any individual can achieve his goals, overcome, or develop. Motivation becomes conscious from an early age and is still active throughout life, being also the key to personal or professional success.

The origin concept of *motivation* comes from the Latin *movere* and refers to an element that is set in motion or something that urges action (Cucoş, 1998). The basic reasons are closely linked to human behavior through a motivational theory that emphasizes the following: the absence or deprivation is followed by satisfaction. At the same time, it reflects a dynamic process in which the hypothesis of unsatisfaction with a need leads to domination and which, in turn, leads to self-satisfaction present in the upper steps of the pyramid of needs (Maslow, 1970).

Kelvin Lancaster (1968) studied the implications of motivation resulting from the totality of individual needs. Therefore, when an individual buys a good (i.e., a house or car) his decision is influenced by price, responsibilities, and by other personal attributes. Motivation can be a positive reaction that causes the individual to take a certain action to meet the identified need. In this context, we note that motivation was studied from both a commercial and a psychological perspective through an introspective technique called psychoanalysis, a context in which the role of inner psychic life that revolves around impulses was highlighted.

Therefore, we appreciate that motivation is the internal deadly force that influences the consumer to find an optimal level of happiness or pleasure. From this perspective, psychoanalysis was used to know and understand motivation, from the desire to generate the acquisition action or not (Dichter, 1964). Moreover, it is the human motivation that determines a certain behavior, representing the basis for the activities carried out to satisfy the primary needs, but also for the acquisition of a good emotional state (Tauber, 1972).

On the other hand, the motivation of human behavior is described as the result of endogenous and exogenous factors; a result that can lead to a sense of accomplishment, recognition, and security. therefore, the level of satisfaction is determined by the relationship between the state of necessity and the actual behavior of consumers (Westbrook and Black, 1985). Based on this approach, the concept of motivation can be explained from the perspective of two points of view. The first one represents the individual plan and the second one aims at the relationship between the individual and the environment. In this regard, motivation appears to be the behavioral manifestations of an individual in buying and consuming goods and/or services, as a result of the emergence of tensions due to unsatisfied needs. Additionally, Cătoiu and Teodorescu (2004) highlighted the fact that reasons are those variables that can influence consumer behavior, while also expressing the vector of biological, social and physical factors.

Based on that, motivation appears as an inner state with a powerful mobilizing role of the entire body's capabilities to achieve a

certain goal. Therefore, the motives have a pronounced multidimensional character, being at the intersection between biological and social, internal drives and knowledge, and between subjective necessity and value as a reference system. Researchers have proposed several ways to classify motives. Cătoiu and Teodorescu (2004) found primary and secondary or rational and emotional drives. Among the variables that can influence consumer behavior are elements such as: family, reference groups, membership groups, social class, culture, respectively subculture.

From a marketing perspective, motivation is the ability to influence the consumer to have a certain behavior in deciding or achieving a goal. Moreover, it can lead to performance if the individual can perform. Motivation can also be strongly influenced by perceived benefits and costs. As Pieters (1991) concluded, the greater the benefits, the more positive the motivation becomes, whereas when the costs are high the motivation becomes negative. The reasons why consumers buy or not a product or service are based on several elements, among which: are the need for diversification, the need for change, the need for consumption, the need to keep up with new trends, and the need for stimulation for certain physical activities or intellectuals.

Motivation could also be interpreted as the ability to make the right decisions when individuals have relevant information and high expectations for a product or service (Hoyer and MacInnis, 2010). Consumers also have social needs such as social experience, the need to communicate with other people, the need to join a group, the need to gain a certain status and position in society, the need for authority, the need for security, but also the need resulting from the pleasure of negotiating (Evans, Jamal and Foxall, 2009). The need for achievement is another reason why people are willing or not to consume certain products or services, and the motivation for achievement is mainly influenced by social factors (Arnould, Price and Zinkhan, 2002).

Motivational theories. The subject of individuals 'motivation was one of the researchers' concerns. However, we note that the theories developed started from the four classical motivational approaches, namely the Freudian theory of impulses, the theory of archetypes, Maslow's pyramid of needs and Murray's theory of personality.

Freud's interpretation of motivation, the doctrine of impulses or Triebtheorie is one of the classical theories of motivation based on which numerous studies and articles on consumer behavior have been conducted. In his work, the sources of conscious motivation were delimited by unconscious sources. Conscious thinking is the place where the thought process takes place and where the need arises. The stage of preconsciousness includes information, ideas, and reminiscences that are not

part of conscious thinking and therefore not active. The subconscious, on the other hand, has information that the consumer cannot activate, as it must be associated with other needs or feelings and is found in dreams, memories or states of unhappiness.

The second classical theory of motivation – Jung's theory of archetypes – refers to the interaction between several variables (conscious, subconscious, and unconscious) and the archetypal matrix that influences human behavior, whether at the level of ideas, morals, or ethics. The third one – Maslow's pyramid of needs – is represented by the hierarchy of human needs, starting from the primary needs, the security and defense needs, the emotional needs, to the need for self-improvement and achievement (Maslow, 2000). The fourth doctrine – Murray's theory of personality – combines the conscious and unconscious feelings of the past and the present, and the most important aspects considered are the physiological ones, as they determine the psychological activity.

There is also another motivational theory called *homeostasis* (Cannon, 1929). It highlights that any action aims to keep bodily functions at an optimal level. The motivations of individuals are not necessarily homeostatic, but biological needs are predicted by the human body as a normal state. The notion started by Cannon led to the formation of the theory of systematic stress reduction which suggests that animals and humans strive to reduce primary needs by energizing the body. The act of consuming water or food reduces thirst and hunger, and the creation of social relationships is meant to reduce loneliness, living in a space as far away from pollution as possible reduces exposure to harmful elements (Hull, 1943).

Starting from Maslow's study, Alderfer (1972) shared a new motivational theory called ERG. Therefore, human needs are represented linearly and not hierarchically, being grouped into three groups of needs: relational, developmental, and existential. Additionally, we point out Hertzberg's (1959) theory of motivation or that of dual factors. It is applicable in the study of employee motivation. People have basic needs such as the need for a roof, the need for food, hygiene, or maintenance, which when not met, make them dissatisfied. He highlighted the times when people were proud of their work and found that they were motivated by factors that decide professional satisfaction such as achievement, recognition, actual work and career progression. There is also another motivational theory based on goal setting (Locke, 1976) and goal theory the motivational theory of achievement was figured out by McClelland Murray (1976), focusing on the needs of achievement, affiliation, and power.

Marketing and motivation. The study of consumer behavior and buyer motivation has

become a very common practice in marketing analysis and research because its potential can be reflected in operational marketing strategies and more. Any form of consumption is an elementary form of our daily life, whether individuals spend their resources only on utilities and household expenses or pay for complex or new interactions.

Tedlow (1997) pointed out that the development of marketing is based on the innovative vision of entrepreneurs who have not hesitated to adopt change as a practice in business strategies. Strong economic development has led to the emergence of elements that have changed both the market for goods and services and certain socio-cultural elements. We note the emergence of the concept of consumer socialization (Ward, 1974), representing a consumption habit by which individuals satisfy, among other things, socialization needs. Additionally, the emergence of the mall's consumer environment offers individuals a point where they can meet their various consumer needs. In this regard, the

consumption motivations of the individual who chooses to visit such an environment can be of different types (Shim *et al.*, 2011).

We note that the purchasing decision is generated by various types of motivations that an individual may have when interacting with such an environment. And therefore, they can manifest different intensities and can influence differently the buying process, the relationships and the dynamics between the specific elements of behavior. Another aspect to keep in mind is the economic development and benefits of digitization. Thus, the increasing consumption of technologies specific to the online environment leads to the emergence of new motivational trends, to the desire to have a much more direct and humane connection with the devices used by shoppers.

Tecmark study (2014) showed that on average a consumer checks their smartphone 221 times a day, which can make them feel trapped. The volume of information in the digital environment (news alerts, WhatsApp messages, viral videos or advertisements) conducted to a digital revolution. All those who connect to various applications via mobile devices are caught in a paradox: the functionality of digital information becomes behavioral (social and cognitive), which affects over time the relationships between individuals, productivity, or power of concentration.

Starting with the explosion of the digital environment as a new business environment for the consumer, specialists in the field have developed both marketing practices and studies on consumer behavior working in the online field. Moreover, they state that motivation is influenced by factors such as the degree of confidence perceived by the consumer when visiting the merchant's website, but also the degree of involvement that the consumer can have.

Angst *et al.* (2008) have shown that consumers' buying decisions in online auctions are affected by the hedonistic need for personal fulfilment. In turn, Vaszquez and Xu (2009) argue that motivation has a strong influence on the process of informing consumers in the online environment. Therefore, a consumer with a utilitarian motivation is looking for relevant information before buying online, while a consumer with a hedonistic motivation is exploring web pages in a way that recreates a walk in the mall. However, there are also points of view that in the online environment the hedonistic motivation of the consumer is strongly linked to the so-called impulsive purchase (Sojoung and Eastin, 2011).

Conclusion

In conclusion, we highlight that the modern motivational marketing environment offers new challenges in the study of consumer behavior through the emergence of new features of motivation. If the development of new physical consumption environments, such as supermarkets or malls, has determined new elements to appear in the marketing environment, the dynamism has accelerated even more with the advent of the online environment. Changes in the marketing environment, as shown by the literature, lead to changes in consumer behaviour and the processes that make it up, including consumer motivation.

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„Data is the new science. Big data holds the answers." Pat Gelsinger
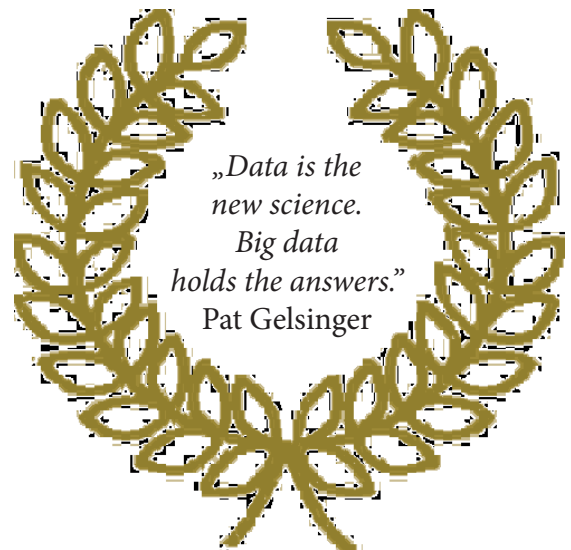
Digitalization and the Perception of Remote Work

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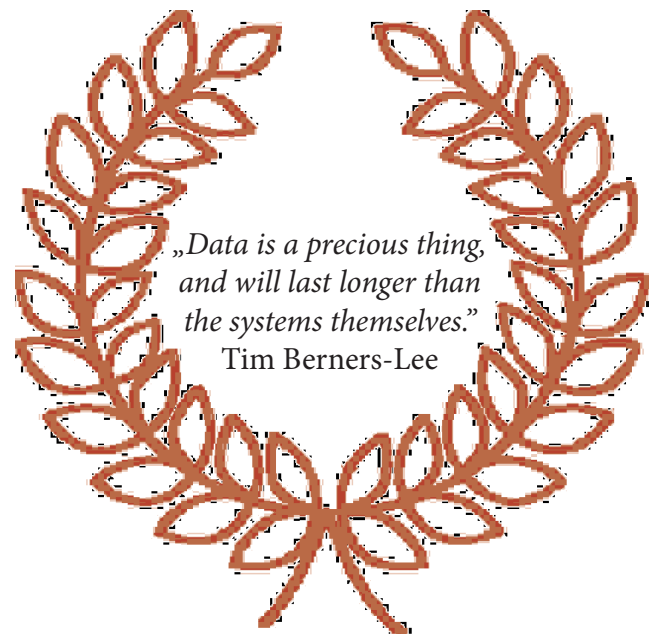
Globalization is characterized by continuous development, with a focus on digitalization, which introduced new forms of employment and organization on the labor market, considering the flexibility to the needs and interests of all parties involved, including employers, employees, as well as the unemployed. Today's growing number of jobs rely heavily on remote working, and this trend is predicted to continue to grow in the future. The objective of this paper was to identify the preferences of young people regarding digitalization and new forms of employment, referring both to the advantages and the impact on their professional performance. The results show that the main forms of remote work adopted by Romanian employees were working from home and telework, followed by portfolio work. The main advantage perceived by young people who worked remotely consisted of the increased balance between personal and professional life, followed by the benefit of freedom in their projects at work. The disadvantages indicated by the respondents were the lack of communication, isolation, or even disconnection from their specific attributions. Nevertheless, digitalization is considered to be developing at a steady pace, supporting the remote working method for most companies in Romania.

Keywords: remote work, digitalization, young people, employees

Introduction

The new way of working at home, also called „*virtual switching*", is quickly becoming known to workers in different sectors of activity, opening up great opportunities for them in the future. The principle consists in limiting the need to travel to the company's headquarters according to a previous schedule, thus allowing the employees to optimize

„Data is a precious thing, and will last longer than the systems themselves."
Tim Berners-Lee

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their work performance following the employer's needs.

The present paper analyzes digitalization as one of the most prominent concepts in recent times. It refers to the accommodation of the hybrid working regime as the most pronounced trend of the year, while digital tools are the vehicle that supports an easy transition. In 2021, the digitization of recruitment switched from a mere preference to a real necessity. If 40% of organizations do not currently use dedicated software for recruitment processes, 34% want to implement one – and the remaining 26% are already equipped for a new digital world (Camacho and Barrios, 2022).

The paper aims to highlight useful information regarding the education of young people, the most attractive fields of employment for them, the skills they must demonstrate in their professional activities, as well as their openness to new forms of employment.

It is intended to analyze the opinion of young people towards new forms of employment on the labour market, their level of satisfaction with both companies and employers, as well as the essential work conditions so that they reach maximum efficiency. All these important aspects will be obtained through statistical methods, resulting from the application and interpretation of the research questionnaire, and will be presented as research conclusions.

General Concepts

Digitalization makes the transition from physical, tangible things, such as forms, documents, photos and sounds to electronic format, so they can be preserved and stored in their new form longer than they would be in the physical. It transforms how it communicates and interacts and involves the transition of certain activities to the digital environment, aiming to facilitate them.

In business, digitalization is the activation, improvement, and transformation of business operations or functions, models, processes, or activities, through the use of digital technologies and data, actionable toward a predetermined objective. Digitalization refers in particular to systems of record, storage, and management, and digitization refers to systems of engagement and knowledge through the use of data and digitized processes.

The second perspective is the digitalization of an environment, area, or flow. The digital workplace involves digital things, digital tools, social collaboration platforms, and unified communication platforms.

The third perspective of digitalization refers to the continued adoption of digital technologies in all social and human activities: digital healthcare, predictive or preventive medicine; governance and digital marketing, digital advertising (Figure 1).
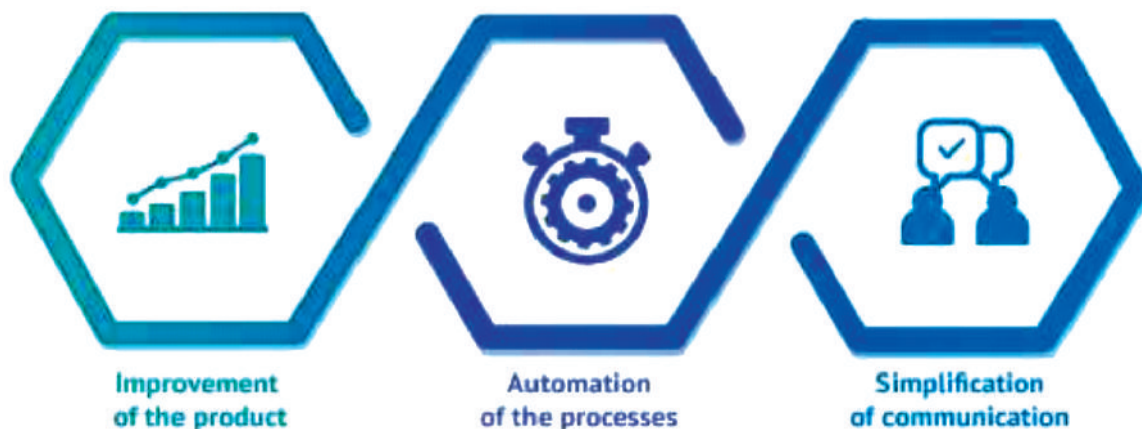
Figure 1 – *The goals of digitalization*
(Source: adapted from INDEEMA 2021)

Digitization has effects on labor force mobility, facilitating the combination of work and private life. In principle, mobile forms of work can be advantageous for employees and employers alike, but this requires the inclusion of additional specifications in employment contracts, which clearly deal with the specifics of remote work.

The new forms of employment in Romania represent an innovative conception of the activity which allows employees to work productively outside the office or traditional workplace. Therefore, it is part of a general trend toward the progressive development of the workplace, as it is among the phenomena specific to difficult periods.

Research Methodology

The objective of the survey was to identify the preferences of young people aged 18 to 35 regarding digitalization and new forms of employment, referring both to the advantages and disadvantages they have and the impact on performance in their professional activity. The secondary research objectives were:

- Determining the compatibility of young people's current job with their previous education.

- Determining the level of openness of young people to the remote way of working, and their perception of the advantages and disadvantages of it.
- Determining the level of openness of young people to adapting to remote work.

Data collection method. The data was collected through social networks, by sending the questionnaire link through email and on the Facebook platform. This method was chosen due to its easiness to reach a broader audience because it ensured anonymity and the respondents enjoyed freedom in filling in the questionnaire at their own convenience.

Elaboration of the questionnaire. The questionnaire consisted of 21 questions, including demographic ones. The authors opted for both single-answer and multiple-answer questions. In creating the questionnaire, the authors considered the logical order of the proposed objectives, thus facilitating the statistical procedures to be applied.

Data verification and centralization. The collected data were processed and centralized using the statistical software IBM SPSS statistics software, version 25.00. The scale-type

questions with nominal and ordinal variables were numerically coded according to the related answers, and multiple-answer questions were divided into single-answer questions for easier processing.

Data Analysis and Interpretation of Results

Research sample description. The target sample consisted of 211 respondents, young people aged between 18 to 35, from Bucharest, Romania, and surrounding villages. The age of the respondents, being an important criterion in the survey, is presented in Figure 2.
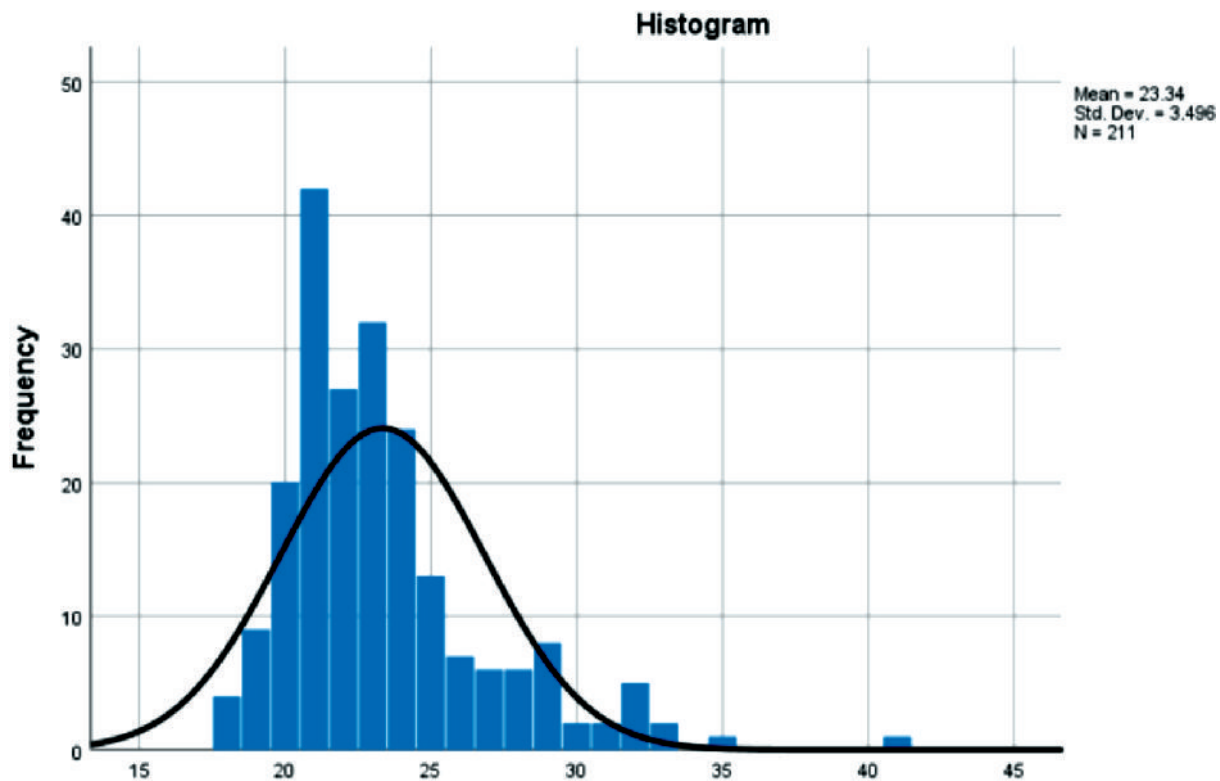

Figure 2 – *Sample structure by age*

It can be observed that the average age of the respondents is 23 years old, hence the sample mainly consisted of young people, as the target population to be studied for their acceptance of the new forms of employment and adapting to the concept of „remote" work in the context of digitalization.

Structure of sample
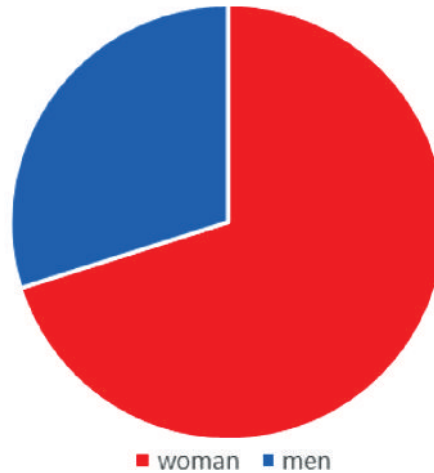
Figure 3 – *Sample structure by gender*

After processing the data in SPSS, the results from Figure 3 were obtained. It can be observed that the sample consisted mainly in women, (red) in proportion of 70,1%, while the men (blue) were only 29,9%.

Based on the results obtained in Figure 4, it can be stated that more than half of the surveyed sample (58,8%), claim that the job is appropriate for the studies followed. On the opposite side, a proportion of 15,2 % declares that the level of work is higher than their studies, from where it can be deduced that young people feel that they are sufficiently prepared professionally for the job requirements in the labor market in Romania.

In your current job, you consider that:

Figure 4 – *Sample structure by the level of qualification in their work*

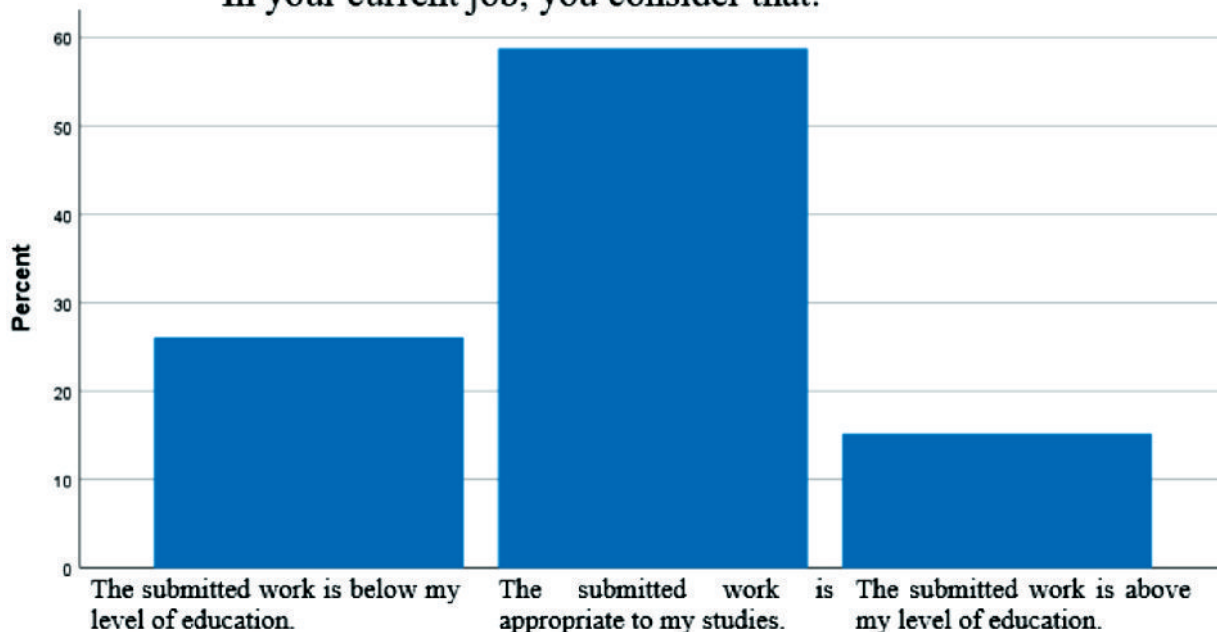To investigate whether there is a connection between the field of activity and the level of qualification of the respondents concerning their work, the authors used the Chi-square test, with the following hypotheses are the following: H_0: The variables are not associated, H_1: The variables are associated.

After processing the data, it was obtained that there is an average significant association between the studied variables, with a value of the Cramer alpha coefficient of 0,3. It can be stated, therefore, that 55.6% of the respondents who work in the IT field declare that the work done is appropriate for the studies they followed. In the Accounting field, 77,8% of the people surveyed support this statement, while on the opposite side, for the respondents who work in other fields, the proportion is only 12%. They believe that their work is of a higher level, superior to the studies they have attended. The respondents were then questioned regarding the work environment (Figure 5).
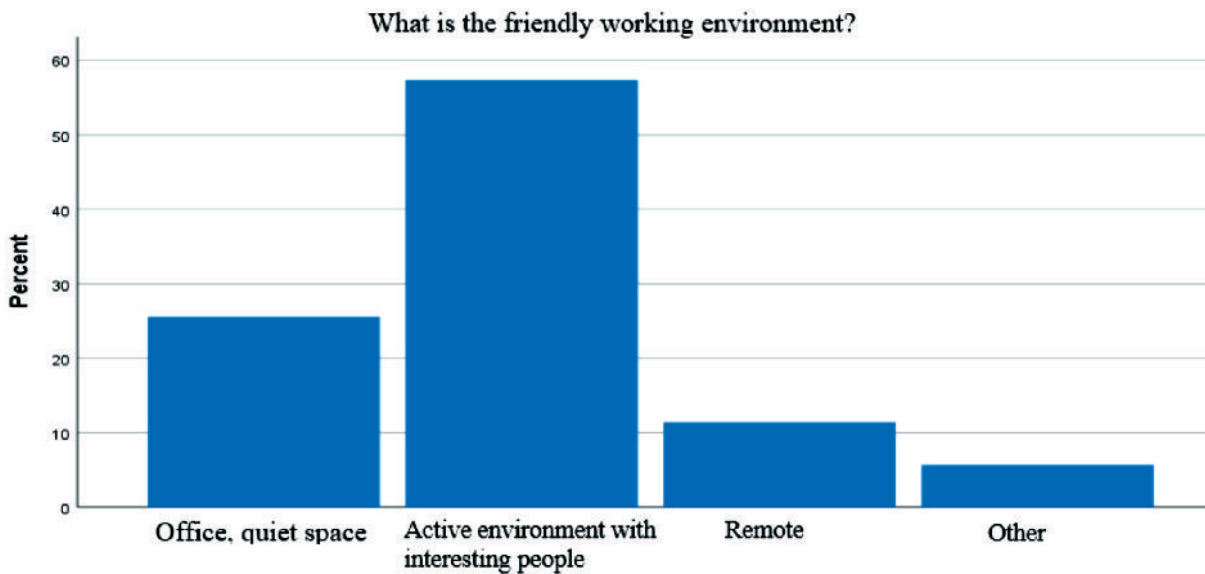
Figure 5 – *Distribution of respondents according to their work environment*

Most employees consider an active work environment favorable because the community is an important factor that supports both personal and professional development. The second choice was an office work environment, as well as a remote work environment. Thus, a proportion of 42,2% of all those surveyed believes that the active environment, accompanied by the presence of pleasant people, brings well-being, compared to 11,3% who opted firmly for remote working.

To determine if there are statistically significant differences between the age of the respondents and their perception of the environment conducive to good work performance, the authors used the ANOVA test. The assumptions associated with Levene's test are:
- H_0: The variances are equal ($\sigma_1^2 = \sigma_2^2 = \sigma_3^2 = \sigma_4^2$),
- H_1: The dispersions are not equal ($\sigma_i^2 \neq \sigma_j^2$, for any i, j from 1 to 4).

Since the value of the Levene test, also known as the homogeneity test, is 0.122, greater than the 0.05 value, it follows that the null hypothesis is accepted, so it can be stated that there are no differences between the variances of the variables. As the condition of homoscedasticity is also met, we can apply for the ANOVA test. The hypotheses for the ANOVA (Analysis of Variance) test are:

- H_0: There are no significant differences between group means ($\mu_1 = \mu_2 = \mu_3 = \mu_4$),
- H_1: There are significant differences between group means ($\mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4$).

The results show that the ANOVA test is significant (F = 0.013), less than the confidence level of 0.05, it can be concluded that there are statistically significant differences between respondents ages of different ages regarding their perception of a work environment conducive to good work performance.

To investigate the perception of the respondents regarding remote work, the authors inquired about the type of contract that the employees preferred to have in this particular work instance (Figure 6).

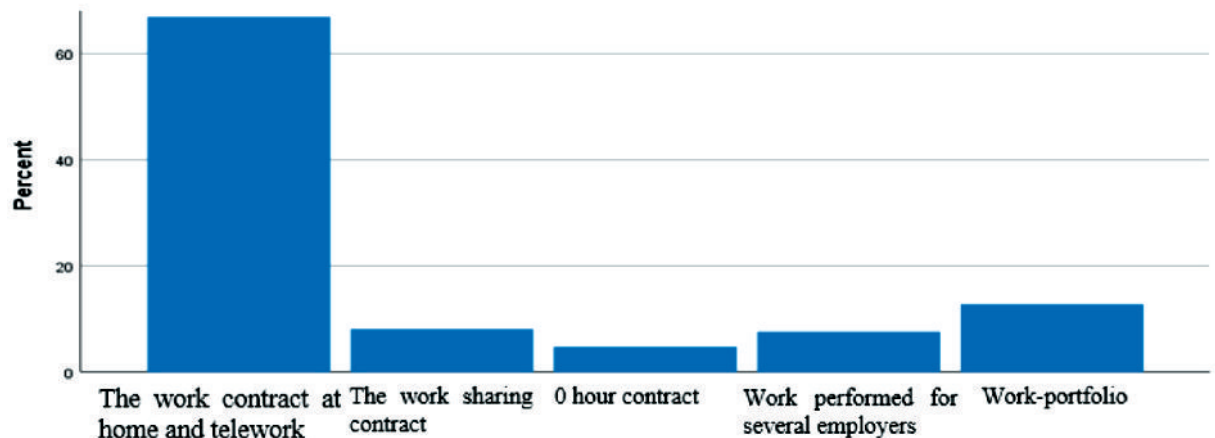You have been placed in the current context in accordance with the new forms of employment of the workforce?

Figure 6 – *Types of remote work forms of employment experienced by the respondents*

As observed in Figure 6, most of the people surveyed worked from home during the pandemic, with a standard deviation of 1.47. At the opposite end, there is the on-call contract, which was the least adopted during this period by the respondents, as well as the job sharing or labour pooling contract. To investigate whether there are associations between the variables of interest (the new forms of employment and the possibility of adapting to these work possibilities), it used the Chi-square test, with the following assumptions:

- H_0: The variables are not associated,
- H_1: The variables are associated.

After processing the data, the result showed that there is a statistically significant association between the investigated variables (Cramer alpha coefficient = 0,27). For the *Chi-square test*, the level of significance was 0.04, lower than the confidence level of 0.05; therefore, the alternative hypothesis was accepted. The statistical test proved that there is an association between the respondents' compatibility and the new form of employment they adopted.

The histogram in Figure 7 shows the perception of the respondents regarding the innovation level of the concept of remote work.

Most respondents considered the remote work concept as being quite innovative, as compared to the regular work regimes they had before. Also, it was found that 86,5% of the surveyed employees worked at home during the pandemic and they believed that the new generation would be attracted to this method.

The respondents were also asked about the main factors which would impact (Figure 8).
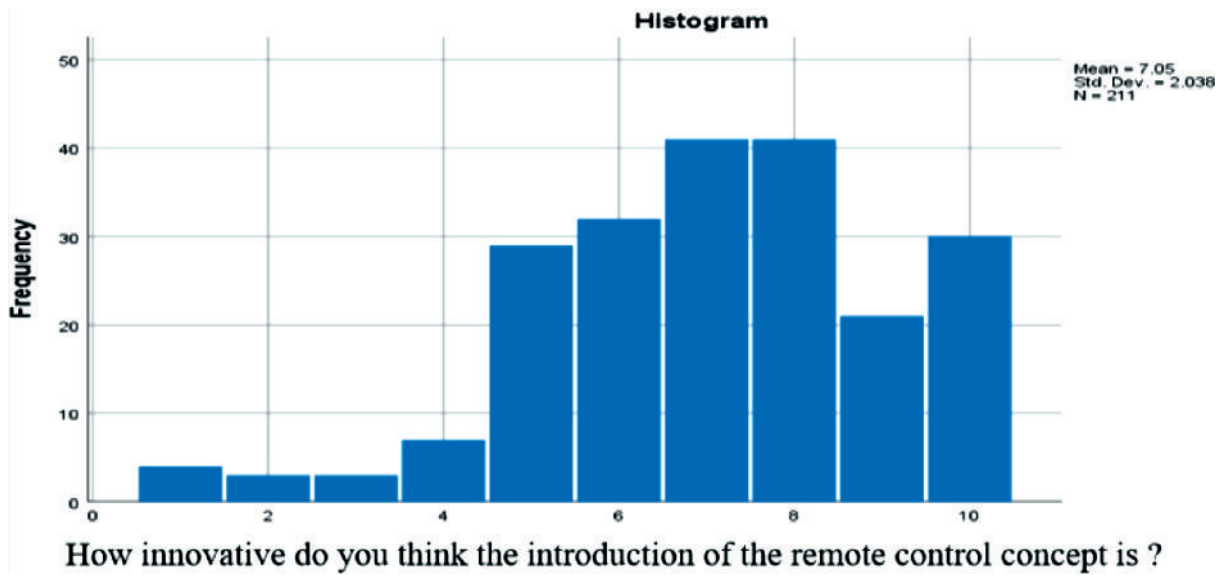
Figure 7 – *Respondents' perception regarding the innovative character*
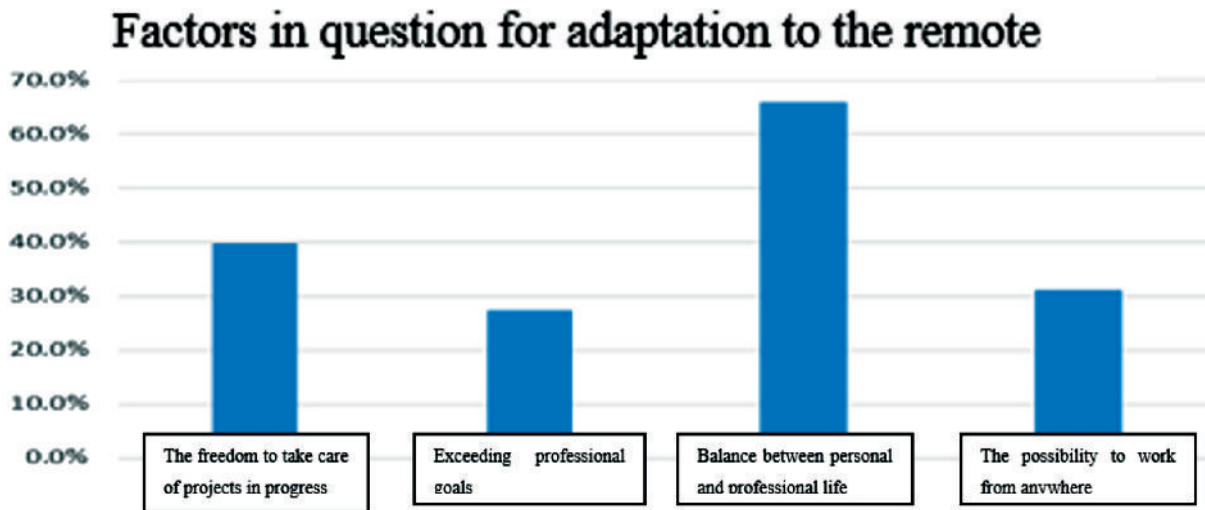
Figure 8 – *Factors contributing to the adaptation to remote work*

In Figure 8, it can be observed that the main factor which motivates most respondents to accept the remote working style is represented by the balance between personal and professional life. Most of the questioned respondents consider it a real advantage.

As for disadvantages, the questioned employees were asked to evaluate 5 main drawbacks of remote work (Figure 9).

The lack of communication with colleagues is considered a significant disadvantage of remote work, as supported by 60% of the employees surveyed, while 52% agreed that isolation is also a harmful factor, due to long periods of working individually.

Other two ordinal variables, namely Flexibility and Efficiency in work were tested as advantages for remote work.
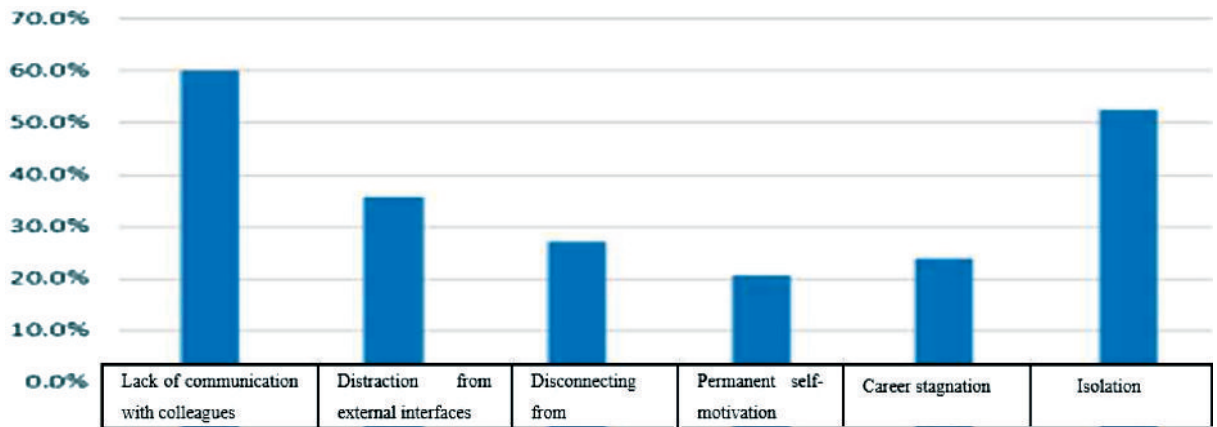
Figure 9 – *Disadvantages of remote work*

Flexibility (How innovative do you think the introduction of the concept of remote control on a wider area? (classified hierarchically, 1-very important/8-not at all important))
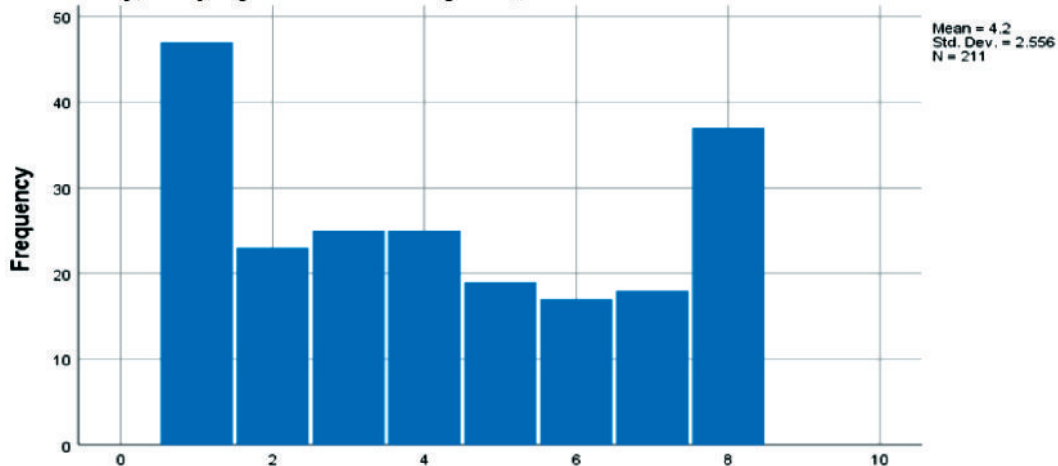
Figure 10 – *Respondent's perception of flexibility as an advantage for remote work*

The Histogram from Figure 10 shows that flexibility is one of the main reasons why young people adapt to this way of working, as 22,3% consider this factor very important. On the opposite end, 8,1% of the young people consider that the factor is of little importance. For a significance level of 95%, the mean value of the „Flexibility" variable is 4,2 and the Skewness asymmetry inducer is 0,199, resulting in a positive asymmetry for this variable.

In Figure 11, the histogram shows that work efficiency is a significant advantage of remote working, as the average value of this variable

is 4,91 out of 5. The Skewness indicator is −0,074, indicating a negative asymmetry.

The authors also calculated the level of significance of Kendall's tau-b indicator, and the result was 0,07 (higher than 0,05), which leads to the conclusion that there is a statistically significant correlation between flexibility and work efficiency variables at a significance level of 93%.

As shown in Figure 12, working remotely from home or a place other than the office is largely considered to be an advantage by most respondents. It is worth mentioning, however,

Work efficiency (How innovative do you think the introduction of the remote concept on a wider area? (classified hierarchically, 1-very important/8-not at all important))

Mean = 4.91
Std. Dev. = 1.868
N = 211
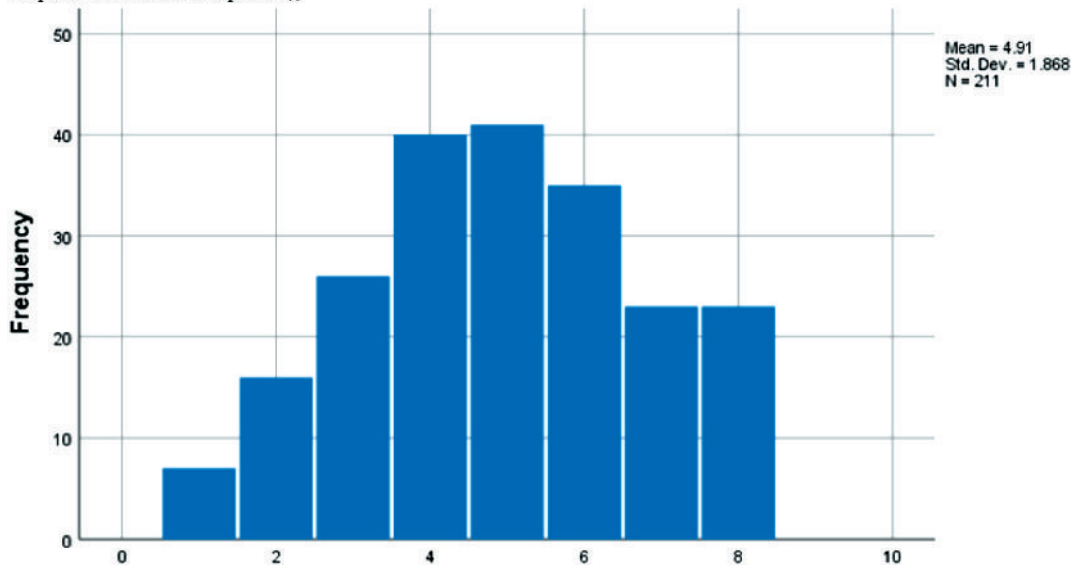
Figure 11 – *Respondent's perception of work efficiency as an advantage for remote work*

Work efficiency (How innovative do you think the introduction of the remote concept on a wider area? (classified hierarchically, 1-very important/8-not at all important))

Mean = 4.91
Std. Dev. = 1.868
N = 211
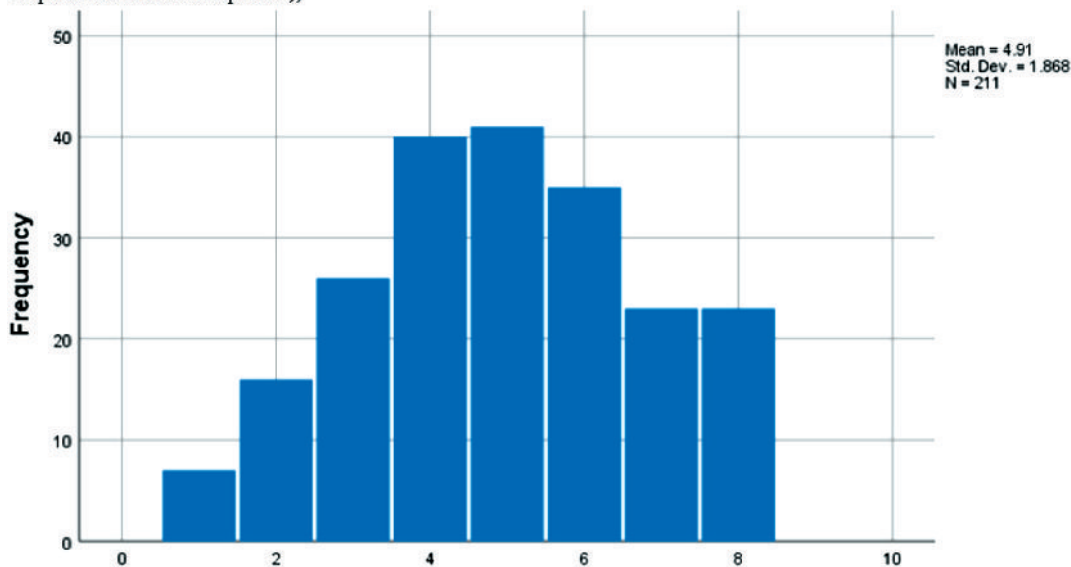
Figure 12 – *Respondent's perception of the relaxing work environment as an advantage for remote work*

that the high standard deviation (2,219) indicates a heterogenous sample, with the respondents having diverse opinions regarding this aspect. One significant concern was the increasing overlapping of work and personal spaces in the case of remote work, which some of the respondents considered problematic.

The value of Kendall's tau-b coefficient is 0,303, with the indicator Sig.= 0.000 < α = 0.05, from which it can be deduced that there is a semi-significant association of medium intensity between the flexibility and the relaxing work environment.

Conclusions

The survey carried out generated some important insights regarding the remote work regime. In the current context, most companies have adapted to the fact that work activities can take place remotely, away from the traditional office, with the main forms adopted being homework and telework, followed by portfolio work.

Regarding the favorable environment for carrying out the work activity, most surveyed employees supported that the active environment, with interesting people, is the most favorable, but some respondents supported the remote concept, considering it an efficient work style.

The authors applied an ANOVA test which proved to be statistically significant and found that there are significant differences between the groups of employees of different ages, so young people's perceptions of the friendly work environment are different according to age, with the active work environment being the most accepted option.

It is also worth noting that the main advantage perceived by young people who work remotely consists in the balance between personal and professional life, followed by the benefit of the freedom they are offered in their projects at work. But this concept also has some weak points confirmed by the respondents, such as the lack of communication, isolation, or even disconnection from their specific attributions.

Regarding the level of innovation of the remote working method, most of the respondents considered it to be a rather innovative work concept, so it can be concluded that remote work is a future trend that will continue to be significantly used in the near future.

Young people stated that flexibility is the main advantage of adopting remote work and that they can work from anywhere and anytime, thus overcoming the barriers of office work. The female gender embraced remote work more, due mainly to their stronger desire to have a balance between personal and professional life.

Also, the authors found statistically significant differences between questioned groups of employees of different ages regarding the favorable work environment: either the active one, with interesting people, or the remote work.

In conclusion, digitalization in Romania is developing at a steady pace, supporting the remote working method for most companies, which helps reduce costs related to office maintenance but also helps to balance a personal and professional life, through flexibility and better time management.

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„*Data is the backbone of successful decision-making.*"
Jeff Rich
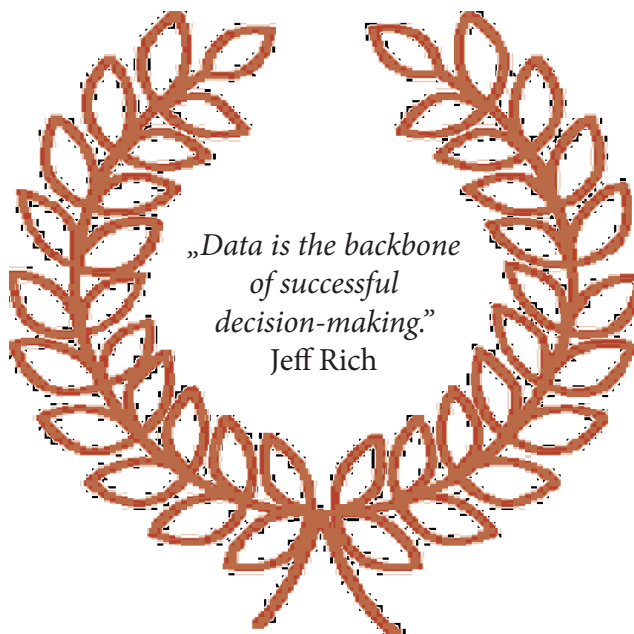
Sustainable Practices in the Supply Chain

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Abstract

The concept of sustainability has become widely expanded in today's business world. Mainly, sustainability in supply chain management has drawn the attention of a wide range of industries, including micro-scale, medium and macro industries. Sustainable supply chain management (SSCM) has been proven advantageous in many industries from time to time and also in daily operations. The SSCM not only help the industries but also plays a vital role in enhancing customer relationship and providing benefits towards economic, environmental and social aspects. The main aim of this research is to understand the concept of sustainability and supply chain management in manufacturing industries and how sustainability can impact supply chain management performance. This research explores the drivers of sustainability and the impact of the indicators on supply chain management, such as cost, quality, flexibility, time and stakeholder involvement in sustainability (Economic, Social and Environmental factors). In this research, a semi-structured interview will be used. Overview information will be collected first, and then a single interview case study would be formulated. Based on the results of the interviews and literature reviewed, a conclusion on the impact of sustainability performance on supply chain management performances would be illustrated.

Keywords: SSCM (Sustainable supply chain management), TBL (Triple bottom line)

„Without data analytics, companies are blind and deaf."
Geoffrey Moore

Introduction

Sustainability is a concept that has been derived from filling the gap between development and the environment. World Commission on environment and development (WCED) has defined sustainable development as, „It is not a fixed state of harmony, but rather a process of change in which
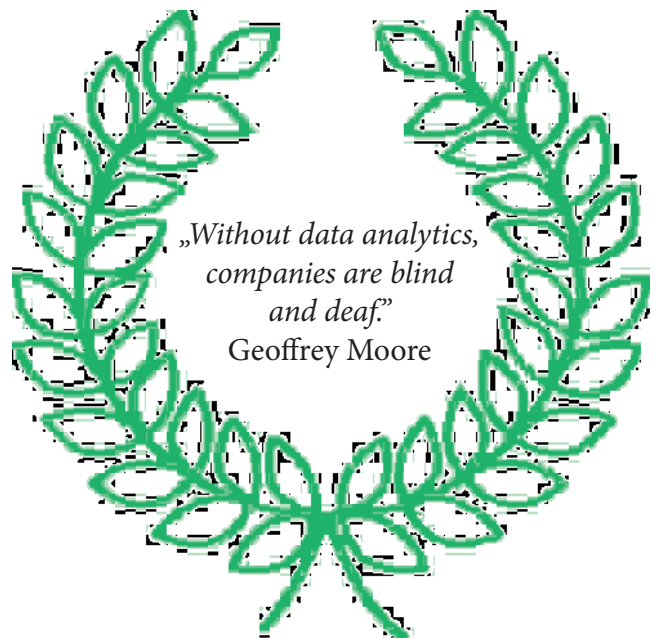
exploitation of resources, the direction of investments, the orientation of technological development, and the institutional change are made consistent with future as well as present needs.", (IFAC, 2019, Imperatives, 1987). The WCED (World Commission on Environmental Development) (Elliott, 2006) brought their report to the world and named the report „Our Common Future," and commonly it is known as „Brundtland Report" as it is named after the Prime Minister of Norway, Gro Harlem Brundtland. Now the committee was clear about where to focus and how to focus, then they met global challenges of sustainability now lying in environmental, social and economic development (Jovane, 2008). The factors of sustainability that are social, economic and environmental are called a triple bottom line. The name itself explains

the three bottom lines of the organization (Alhassan, 2014).

The primary objective of this research is to understand the concept of sustainability in Supply Chain Management and its role in the present manufacturing sector (automobile industry). To understand the supply chain strategy framework, it focuses on the impact of the sustainability performances that include economic, social and environmental performances on supply chain management performances, i.e. cost, quality, time, flexibility and stakeholder involvement. The practical method is the interview method with experts from the manufacturing sector.

Sustainability performances. The economic performance, environmental performance and social performance are treated as sustainability initiatives. These sustainability

initiatives have an impact on the supply chain management performances that is cost, quality, time, flexibility and stakeholder performance. The sustainability performance's impact on the supply chain management performances in the automobile industries is the objective of the paper.

Environmental Performance. Environmental performance can be defined as „Development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Sloan, 2010, WCED, 1987). The name environmental performance itself describes the performance that impacts the environment based on its process. The automobile industries play a vital role in impacting the environment and surroundings. The below performances are part of the environmental performance that impacts the sustainability of the supply chain management performances, (Li, 2014, Ambe, 2014) minimizing noise pollution, minimize of non-product output, machine consumption, improving land utilization, improving water utilization, and decreasing air emission. The automobile industries recognize the environmental performance as a revenue of the firm and also a positive impact on the environment.

Economic Performance. The economic performance is treated as the main performance according to the firms. The economic performance is not only related to the revenue of the firm but also to the environmental performance. The economic performance factors that have been used in this research are as follows: the decrease in labour cost, the increase of Return on Investment, the increase of return on assets, profit margin, increasing productivity, cost per operating hour, material cost, order filled lead time, and net profit. Companies focus on economic

performance so that they can improve their revenues and also improve environmental performance. The performances are related to each other. The above examples of economic performance give a brief understanding of the level of economic performance, (Li, 2014, Ambe, 2014).

Social Performance. Social performances are part of sustainability performance. The supply chain management performances provide information about the impact on sustainability performance. The economic performance factors that have been used in this research are as follows: the decrease in accident rate, maximizing of employee involvement, bonding of labour relationships, gender Equality, occupational health and safety, Improving training and education, and the decrease of customer complaints. The above examples provide the necessary information about social performance, (Li, 2014, Ambe, 2014).
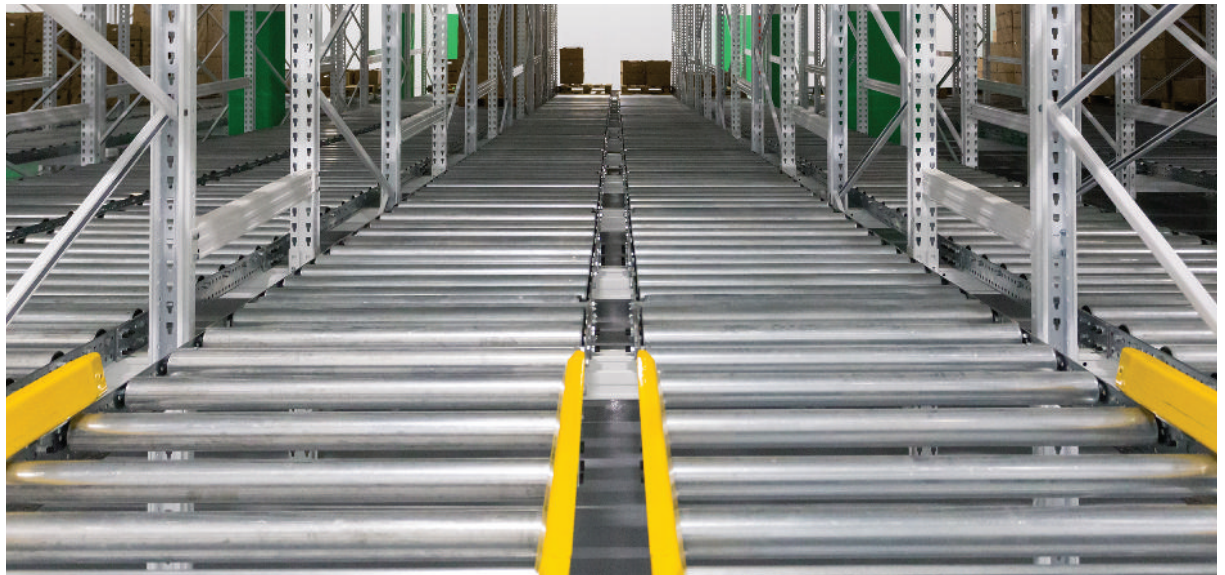
Supply Chain Management Performances

SCM performance is reflected in cost, quality, time, flexibility and stakeholder involvement.

Cost. The cost performance is treated as one of the important indicators of the supply chain. Below are examples of the cost indicators that can be treated as a part of the supply chain (Li, 2014, Bolstorff, 2003) production lead time, and utilization of standard operating procedure.

Total supply chain management cost – The cost deals with the processes of planning, sourcing, delivering and returning).

Bid Management cost – The cost of bidding is the process to overtake the projects.

Production Cost – Land, labour, capital and enterprise costs.

Here the cost performance is treated as a single entity as there are many examples of the cost performance depending on the process and products. The cost performance is treated as a part of the automobile industry, (Fawcett, 2007, McAdam, 2001).

Quality. The Quality performance is similar to the fitness of use of the supply chain. Customers need to have such quality before placing an order, and it is also playing as a strategy tool in the business, (Jacobs, 2004, Hausman, 2005, McAdam, 2001). The quality factors are as follow: meeting daily standards, quality award standards, product per unit sold, the fitness of use, product durability of the end products, decreasing Customer complaints, decreasing Reclamations from Customer, minimizing Scrap and rework, and minimizing Rejection rate of the products after manufacturing.

Time. The time indicators can be explained as follow (Beamon, 1999): delivery to customer requested date, cash to cash cycle time, delivery to customer requested date, and order fulfilment lead time.

Flexibility. Flexibility can be the measurement of performance, which is how quickly the automobile industry can attain flexibility based on customer requests. The below examples give an idea about the flexibility in terms of the automobile manufacturer in the supply chain management process (Phillips, Reichart, 2000) such as volume flexibility

(the ability to change the output levels of the products produced), delivery flexibility (the ability to accommodate periods of poor delivery performance), flexible contract terms and conditions, flexibility in production or manufacturing, level of market share controlled by green products, number of inventory returns, economies of policies, technology flexibility, and product and process flexibility.

Stakeholder Involvement. The involvement of the stakeholders in the supply chain cycle is an essential role in the development of sustainability. The stakeholders can be seen as human beings, groups and organizations that improve, analyze the nature of the work and strive for the betterment of the company. The following examples can give an idea about the stakeholder involvement in the supply chain, (Beckett, Jonker, 2002, May 1991) such as a friendly and positive place to work, always maintaining government accreditations, achieving financial budgets and targets, new locations identified growth, engaging with the client positive programs and activities.

In figure 1, the sustainability performances define the impact on the supply chain performance indicators, i.e. cost, quality, time, flexibility and stakeholder involvement.
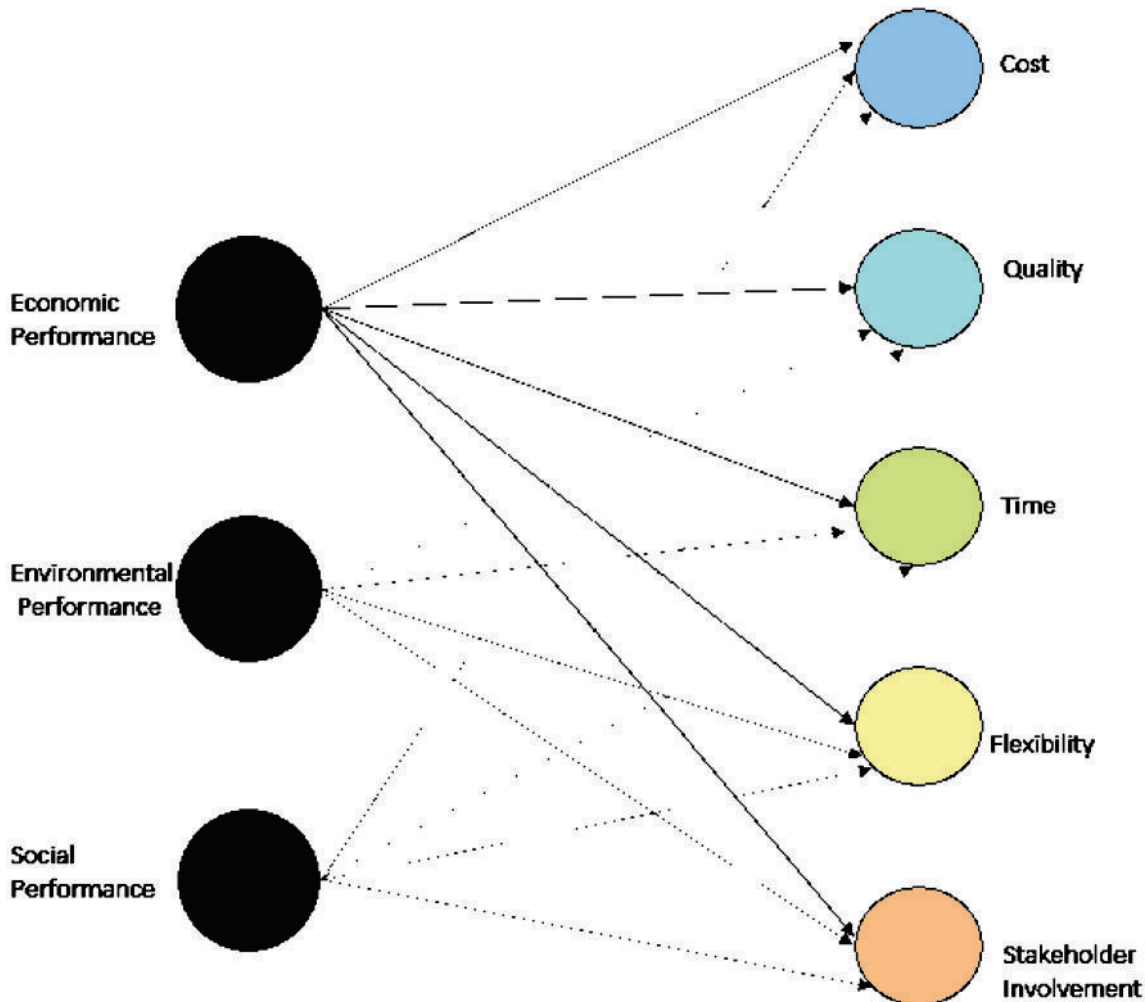

Figure 1 – *Research concept*

Research Methodology

The interview approach is a bridge to the qualitative method where data pass from the bridge called the interview process and find a way to the qualitative method. The supply chain is a vast topic, and it is not easy to find everything from the books because day by day new challenges and obstacles arise. Therefore, the researchers conducted interview sessions with a very experienced person to find the tactics and strategies used in sustainable practices in real-time industries. This will allow the exploration of practical problems in real-time industries.

Data Analysis and Results

Interview 1. The first interview was with the supply chain manager of the automobile unit who manages the production planning, supplier integration, forecast techniques, customer contacts, logistics planning, MES (Manufacturing Execution System), business operations, the flow of goods and problem-solving and who coordinates the procurement department, selling department, production department and quality department. The manager has more than 25 years of experience in this field. As per the manager's opinion, sustainable initiatives have been increasing a lot in many industries, including the current company. The company faced problems in production planning as production planning plays a vital role in the process because the production department, the quality department, the logistics department, the sales department, and the finance department all depend on production planning. Production planning depends on the customer's request and the production data. However, the production data that we collect from the assembly line is not perfect and not up to the mark.

We need accurate data because the simple principle is that time is money. Rather than collecting the data manually, they have upgraded the data collection method using a software system called MES-Manufacturing Execution System. With the help of this technique, production planning has improved a lot.

The best sustainability technique they have implemented is upgrading the IT system. They have a very little amount, but now with the help of this system, they can easily keep updated with the production data. The integration of the IT tools played an important role in monitoring the exact amount of production data, and based on that it indirectly affected many other departments in the company, and the process has been flexible and forecasting has been improved. Integrating several production systems and quality systems has helped the company a lot, mainly in the procurement department.

Coming to the next phase, the manager was telling us about the critical information regarding the economic factors. From my questionnaire, they considered that the critical factors were the decrease in labour cost, an increase in return on investment and cost

per operating hour. Mainly to decrease labour costs, they are implementing AGV (automated guided vehicles), but these vehicles are used to transport the pallets only in the warehouse and production area. It is operated based on the navigable software it previously coded and linked with the production software that is based on the planned date and planned time the AGV goes to the specified spot and picks the pallets that reduce much human effort, and AGVs are the one-time investment.

These are entirely environmentally friendly, which plays an essential role in the economic factor of the company. This concept not only supports the economic conditions of the company but also indirectly supports the environmental performance. For economic performance and sustainability, the corporate unit is investing much money in the integration of the supply chain.

This company used to have more manufacturing sectors in the factory, but they have closed everything and manufactured in other European countries to reduce the manufacturing cost, labour cost, energy cost, and flexibility with workers, and the company

could spend only on logistics integration. The assembling of the parts will be produced in Germany; in this case business operation plays a very crucial role in the logistics network. The reduction of the material cost will be more advantageous towards the sustainability of the process. According to the manager's view, supply chain management will be evolved into a significant sector in the future. Mainly, multinational companies are spending economically and socially in this sector.

The above strategies are used to tackle them and improve their economic performance.

In the next phase of the interview, we were speaking about social performance and how the organization is taking necessary steps to decrease the accident rates in the company.

Every month they conduct different types of training and workshops to avoid unexpected accidents. Mainly, in this organization's structure in every step, the employee involvement is outstanding. Due to employee involvement, the required information is shared and, each week, they propose employee meetings concerning their supervisors. The skill development program is for the employees working in the company. Regardless of the employee scale, any employee can participate here. Employee involvement, training and education play an essential role in the sustainability of the company's performance. The relationship between labour and management is perfect because of the above factors. This company not only strives to achieve the sustainability target but also provides primary education to the other partner companies about the importance of sustainability.

Interview 2. Simultaneously, we got a chance to interview the supply chain planners who were dealing with supplier integration and third-party logistics. We interviewed the supply chain analyst. They were facing a problem with the supplier due to less availability

of the raw material and due to the limited number of suppliers. The most significant challenge would be supplier commitment and support. The manufacturing of the assembled components is not easy to find based on the technical specifications and needs excellent skilled workers to produce the parts. Due to less availability of the suppliers, the suppliers are not able to supply the components, resulting in the delay of production. After many obstacles, they have opted for and maintained the best supplier quality integration. But with the help of the scorecards and supplier quality management strategies, they are outstanding in the process. This company, they don't depend on one supplier; they have national, international and local suppliers. If the company is approaching international suppliers, this means the international supplier would be less expensive and has more quality of the product compared to the other suppliers in the market. In the international supplier, the approach company makes the contract for the long term. The national supplier would be the sister company so it would be a backup option for the company in case of a disruption of the supply. But from the national suppliers, the purchasing of the products would be minimal compared to the international supplier. The local suppliers are the backup option for the company in case of disruption of the supply. Mainly, local suppliers would be used for the important customers, mainly for customer satisfaction and supply of the finished products to the customers on time. But the purchasing would be very less compared to national and international suppliers. This process is known as the Matrix Supplier tool; it is a method and is configured with unique software. For this software, the forecasting and production planning would be integrated, and the data would continuously be fed through the live cloud platform. To support the supplier in case of late delivery, the firm's strategy is to arrange a special ride to the supplier even if it is expensive, but the company's main philosophy is to deliver the product according to the customer's requirements. RFID is playing an important role in sustainability, mainly in the logistics sector. It is not an expensive cost, around 10 to 20 cents in between and indicating the supplier and even the customer to track down the delivery of the products.

For the manufacturing of hydraulic brakes, the protective sleeve of the brake has to be lubricated with HBS oil. This oil is extensively used in the process of lubrication. For the sustainability of this process and concerns about the environmental factors, the production team has concluded to filter the used oil, and with the help of the filtration process, the oil can be used two to three times. After that, the remaining oil is transported to the other firms for the other application processes. Here the environmental factor is playing an important role and also an economic factor is extensively integrated with environmental factors that are directly affecting the cost, quality, time, flexibility and also stakeholder performances. Transporting the reused

oil from industry to other firms is done by efficient planning, by the supply chain planners.

What we analyzed in the interview with the manager and planners was almost similar, but the only difference was that while the manager is focusing on how to tackle future-oriented problems, the planners are mainly focusing on how to tackle the daily obstacles and mainly on business operations. The interviews were almost similar, but we found many similarities between the manager's and the planner's responses.

Interviews 3 and 4. In the above interview, the technical part was missing to ensure that from the technical side, we interviewed the Quality Management Manager of the automobile unit. In the process of the interview, we asked him mainly about the sustainable initiatives used in the whole supply chain process. I got more information over here regarding the technical side both in the production and quality department. From the point of view of sustainability, he has mentioned that International Standards Organization (ISO) certifications are essential for the products and that the companies that are producing the automobile products have more specifications compared to the other products. Earlier, many automobile companies used to manage with ISO certification, but now automobile companies should have International Standard for Automotive Quality Management Systems (IATF) certifications proposed mainly for automobile products. These certifications are achieved when a company achieves economic performance, environmental performance, and social performance. This is a direct step toward achieving sustainable initiatives. Even sustainability is a part of the company's main objectives.

The organization plays a vital role in achieving sustainable initiatives. Each member of

the organization is responsible for integrating sustainability into the process. Even the regulations from the government and the company strive for sustainability. In economic performances, the decrease in the labour cost is playing an important role because, in the above interview with another manager, it is mentioned. Here he had given me an example that automobile parts are significant to sustain extensive and precise manufacturing. Earlier a team of more than 30 members used to manually check each part, but now due to automation, it has been gradually reduced to 4 members of the team. They used a camera coordinate proofing method; it is a unique type of method to check every part from 8 directions. If an automobile is produced, then the dimensions should be exact and accurate because if it is not accurate, then it may be a danger to the customer. Therefore, the programmed pixel camera is used so while manufacturing this product, the camera pixels are fixed and the product should be matched according to the pixel coordinates. Then, the products can be passed through the next step. If it is not matched, the machine punches the product with an identifying mark, so that is the reason quality plays a

vital role in manufacturing automobile products. There is a team called the environmental department/green practitioners; this team plays a significant role in environmental performance. They help the organization to run through sustainability in environmental performances. This team of green practitioners checks the noise pollution of the automation machines while manufacturing twice a week. If it is more than the prescribed decibel, then they take necessary actions to prevent the root cause, minimizing not only the sound but also the non-product output, minimizing the water utilization and minimizing the energy consumption. In this company, air emissions are less due to the implementation of automation and industry 4.0.

Coming to the quality indicator meeting, daily standards are defined daily and discussed in the daily production meeting. Here the product per unit sold is an important criterion, but mainly here they measure ppm which stands for parts per million sold and also measures the defects. Here decreasing customer complaints is always a big issue in production, quality, and logistics because here it deals with customer satisfaction and the customer-supplying relationship to be maintained. Mainly, they maintained the sustainability in quality by CQTS, Pareto analysis and direct interaction with the customers. One of the projects is NTF-no trouble found to project to decrease the number of incidents. The camera detection process would also be implying to the ntf incidents. In stakeholder involvement, they use a method known as the GEMBA walk technique; it is conducted twice a month mainly where the involvement of each employee takes place. GEMBA walk is done by quality, production, and supply chain heads; in this process, they go to each workstation, warehouse, and quality proofing department to discuss their problems, and

improvements in the process and take advice for the next orders to maintain equity among all the departments, frequently inviting the customers to see the process and plants and get engaged in positive programs and activities. They use an online involvement portal CIM, standing for continental idea management, where all the employees are always encouraged to get involved in this online tool to get new ideas and developments. It is also rewarded according to the idea. Inflexibility and time indicators, technology flexibility and delivery to customer-requested dates were focused on more. Because of the technology flexibility, many processes have become flexible to use and delivery to the customer-requested date is a vital role in the whole supply chain process. The Automatic SAP process in warehouse management is integrated with another software program when the products are being stowed according to the space systematic arrangement made by the logistics team. Automatic packaging according to the

customer requirement is already programmed in the software: based on the purchasing order number, the machine packs automatically. If the delivery of the product according to the customer's requested date is not done by the company, and they have to reduce points from the Q1 sustainability (quality) award, then the firm has to do a lot of documentation, and other specifications are included to prove the customer about their process. Then the company has to hire more employees, acquire more technical machinery and spare a lot of time on every order placed by the customer which leads to the delay in production, logistics, and packaging and would be a revenue loss to the company. Their annual sales will decrease and become difficult to compete with competitors. That is the reason firms strive to maintain the delivery of the product according to the customer's requested date. The sustainable performances are measured accordingly to the Scorecard rating: if it is more sustainable and maintains all the above-discussed criteria, it is given points; if it is 95 to 100 then the gold rating and if 90 to 99 it is a silver rating. According to the participants, more and more companies participating in sustainable initiatives and even customers are requesting sustainable reports before placing an order with the firm. The primary objectives are conducting face-to-face interviews with experts or employees working in the supply chain industries and finding out the impacts of economic, environmental and social performances on cost, quality, time, flexibility and stakeholder involvement indicators. The paper's objectives are to identify the various drivers of sustainability in supply chain management.

Interview summary. Analyzing the interviews' data yields information on how sustainable initiatives are being implemented in the manufacturing industries. The information finds out how sustainable practices are implemented practically. The above information clarifies why economic, environmental and social performances are essential performances of sustainability. Each performance is co-related to other performances; that is, if one performance is being implemented indirectly, it positively influences the other performances. Environmental performance is playing an essential role in the manufacturing industries, which positively impacts the other indicators of supply chain management. Even the participants accept that customers are also playing an important role in practising the sustainable initiatives that are before the order; the customer wants to see that the seller follows all the sustainable initiatives in their respective companies; then the customer places an order. With these types of practices, sustainable initiatives are being implemented in more and more industries.

From the literature, it has been considered that sustainable initiatives show a positive impact on supply chain management performances. From the main objective, i.e. from the interview results, it has been found that sustainable practices play an essential role and show a positive influence on the supply chain management performance. From the interview results, it has been found that customer satisfaction level, delivery to the customer requested date, maintaining ISO standards, manufacturing flexibility, friendly place to work, decreasing customer requests and decreasing production lead time, and many more indicators influence the whole supply chain management.

Conclusions

The primary purpose of the study is to understand the concept of sustainability and sustainability practices in supply chain management performances. Based on the interviews, it has been found that the reason for adopting sustainability initiatives in the supply chain is enhancing customer satisfaction and return on investment, attracting new customers and sustaining competitive advantage.

From Interview 1, it can be concluded that the sustainability performances were acting as a strategic tool to improve the sales and revenue of the company. The sustainability performances spark innovation and build new capabilities. From Interviews 2 and 3, it can be concluded that there are some challenges to integrating sustainability in the supply chain such as poor supplier commitment. More focus on environmental performance simultaneously improves economic performance, which positively impacts the automobile industries. Even customers are requesting the suppliers to provide sustainability reports before placing an order. From Interview 4, it

is concluded that integrating sustainability performances in supply chain management results in the improvement of the customer satisfaction level. From the above interviews, it can be concluded that involving all the stakeholders in sustainable initiatives can play an essential role in the automobile industry. Sustainability initiatives became a marketing strategy tool for the company. Economic performances have a positive influence on cost, quality, time and flexibility, but not a positive influence on stakeholders' involvement.

The environmental performances have a positive influence on the cost, and quality but not on time, flexibility and stakeholder involvement performances. Social performance has a more positive influence on stakeholder involvement, cost and quality than on flexibility and time indicators of the supply chain management indicators in the automobile industries. The findings of this research support the empirical findings. All the interviewees have experienced during their working tenure that initiatives were helpful to bring positive logistical development by considering the environmental, social and economic aspects. These have encouraged customers to do their business sustainably. Additionally,

sustainability is now a marketing agenda that has increased competitiveness by improving performance. Sustainability initiatives are challenging to all sizes of industries. However, only medium to big-size industries have taken steps to adopt these initiatives.

This study focused on a single case study of a manufacturing company in the automobile industry in a developed country. More case studies need to be conducted in different industries; in addition, a comparative study between manufacturing companies in developed and developing countries will enhance the understanding of how.

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„Data-driven companies treat their data as a corporate asset."
Tom Davenport
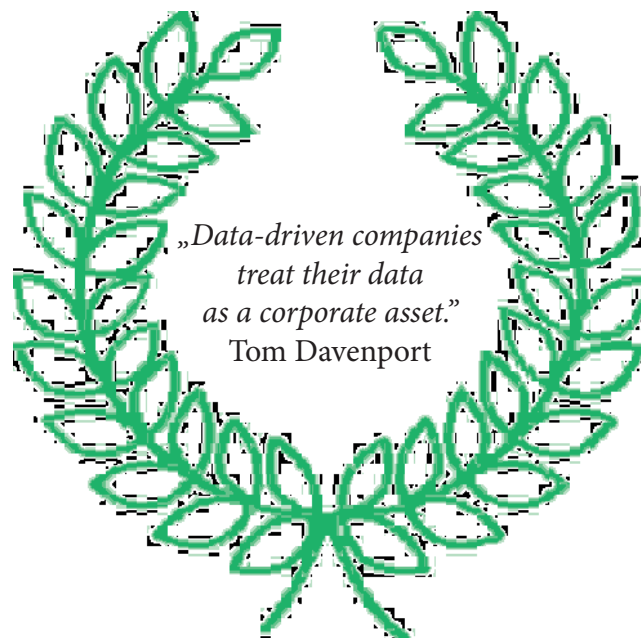
State of the Art in Employee Retention

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Abstract

Employee retention is a critical factor for the success of any organization, and retaining talented employees has become an increasingly challenging task for employers worldwide. In recent years, the business world has witnessed significant changes, including a global pandemic, new technologies, and an increasingly competitive job market. To address these challenges, employers must develop effective employee retention strategies. This literature review aims to provide an overview of the current research on employee retention, focusing on the main methods used by companies to retain their employees. The review is important for organizations seeking to develop effective employee retention strategies in the ever-changing business landscape. By synthesizing and analyzing the latest research, this review can help organizations better understand the most effective methods to retain their valuable employees.
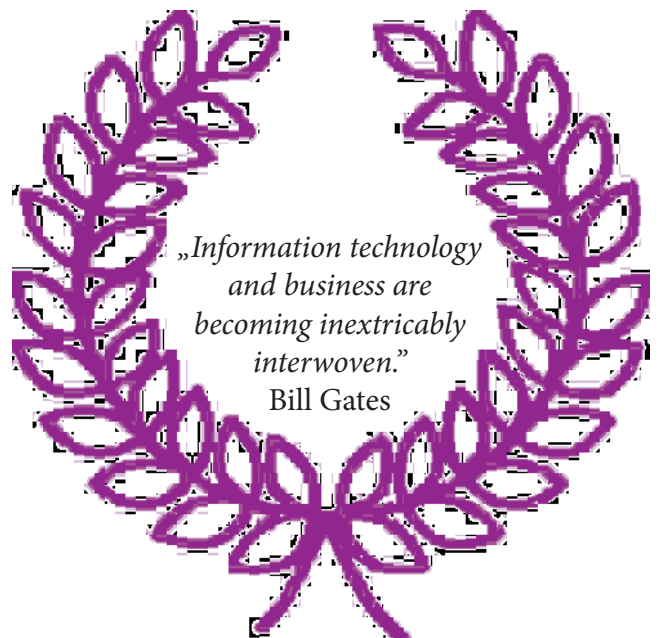
Keywords: employee turnover, retention strategies, employee engagement

Introduction

Employee retention is an important issue for organizations across Europe. The region has a highly competitive labor market, with many companies competing for the same pool of highly skilled and qualified workers. As a result, organizations must implement effective retention strategies to attract, engage, and retain their top talent.

One of the biggest challenges facing organizations in Europe is the high rate of employee turnover. According to data from Eurostat, the average turnover rate in the European Union was around 14% in 2020 (Eurostat, 2020). This is a significant challenge for organizations, as high turnover can be costly and disrupt the continuity of business operations.

To combat this challenge, many organizations in Europe are focusing on employee engagement

„Information technology and business are becoming inextricably interwoven.”
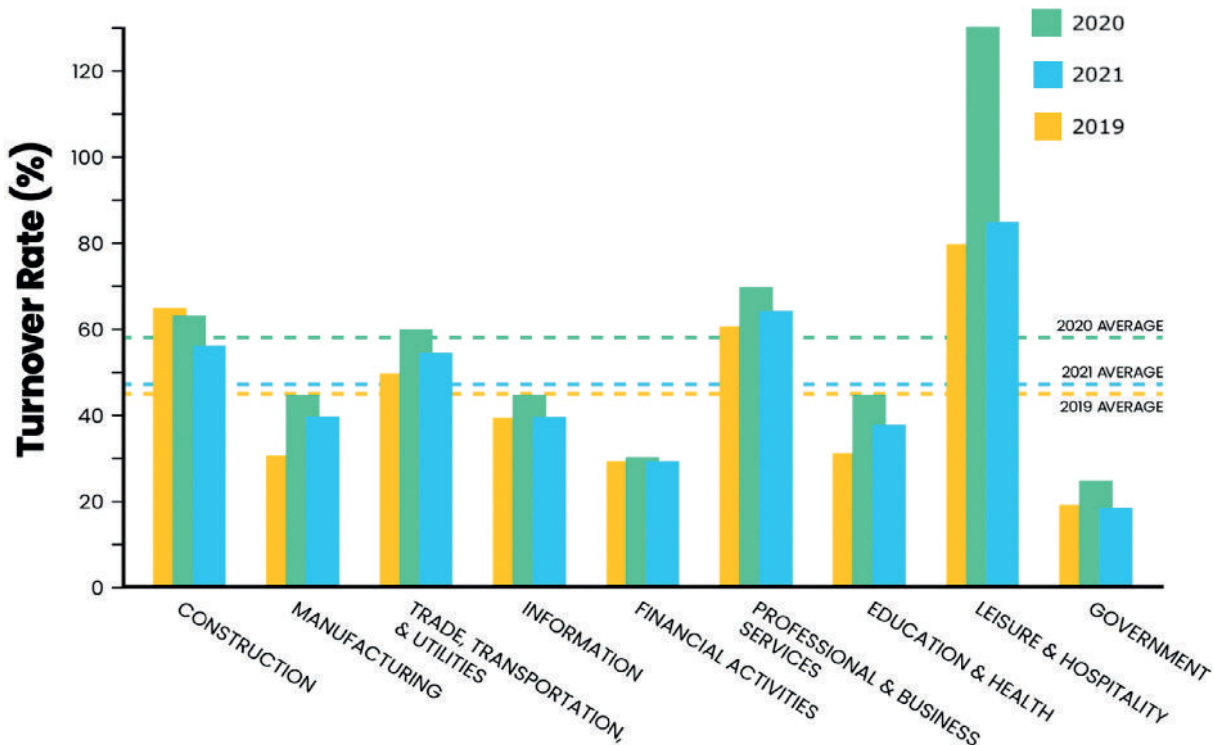Bill Gates

must implement effective retention strategies to attract, engage, and retain their top talent.

According to a study by the National Institute of Statistics in Romania, the employee turnover rate in the country was 21.2% in the third quarter of 2021 (INSSE, 2021). This high rate of employee turnover can be costly for organizations, both in terms of financial resources and loss of talent and expertise.

Overall, employee retention is a critical issue for organizations in Europe. By implementing effective retention strategies such as employee engagement initiatives, competitive compensation and benefits packages, and employee training and development programs, organizations can attract and retain their top talent and build a strong, skilled workforce.

State of the Art

The turnover rates vary across industries, making it difficult to establish a universal benchmark. However, a 45.1% turnover rate can be considered a good baseline for the upcoming year. In 2020, due to the COVID-19 pandemic, every industry experienced a significant increase in turnover rates, with the leisure and hospitality industry having the highest rate at over 51%. The pandemic resulted in many companies closing down, downsizing, or transitioning to remote work, leading to increased turnover. As the pandemic started to subside in 2021, companies adapted to new work arrangements and implemented healthier practices, resulting in lower overall turnover rates. However, it's important to note that turnover rates include all employees who left a company, including those who retired, were fired, or were discharged. Voluntary quits, on the other hand, reached a record high in 2021, with 47.4 million people quitting their jobs, the highest number in years (Figure 1).

and satisfaction as key drivers of retention. They are investing in programs and initiatives that foster a positive work environment, such as offering flexible working arrangements, providing opportunities for professional development, and promoting work-life balance. Another important retention strategy for organizations in Europe is to offer competitive compensation and benefits packages. This can include providing salaries that are in line with industry standards, offering health and wellness benefits, and providing retirement plans and other financial incentives. In addition, many organizations in Europe are investing in employee training and development programs to improve retention rates. By providing employees with opportunities to develop new skills and knowledge, organizations can increase job satisfaction and engagement, and make employees more valuable to the organization.

Romania, is a highly competitive labor market, with many companies competing for the same pool of highly skilled and qualified workers. As a result, organizations in Romania

Figure 1 – *Average employee turnover rates by Industry 2019-2021*
(Source: Awardco, 2022)

As of 2022, the global workforce stands at around 3.9 billion people, according to data from the International Labour Organization (ILO). This represents an increase of approximately 1.5% from the previous year. Of this total, around 2.4 billion people are employed in the services sector, followed by the industry sector with approximately 1.3 billion employees and the remaining workforce in agriculture. The pandemic has had a significant impact on the labor market, with the ILO estimating that global working hours declined by 4.3% in 2020, equivalent to the loss of 125 million full-time jobs. While the job market is expected to recover in 2022, there are still significant challenges to be faced, particularly concerning the quality of employment, which has been a growing concern in recent years. This includes issues such as low pay, lack of job security, and limited opportunities for career advancement (ILO, 2022).

Literature Review

The objective of this literature review is to present a comprehensive analysis of the recent studies conducted on employee retention in the period of 2019-2021, emphasizing the primary strategies implemented by organizations to retain their workforce. Yang and Park (2021) made a systematic review of the existing literature on employee retention strategies in the hospitality industry, analyzing 30 articles published between 2011 and 2020. The authors identified six main retention strategies: career development, rewards and recognition, work-life balance, leadership, organizational culture, and communication. They found that a combination of these strategies is most effective in retaining employees in the hospitality industry.

Another study on employee retention strategies in healthcare organizations, focusing on articles published between 2015 and 2020

is also presented by Kim *et al.* (2021). The authors identified four main categories of retention strategies: job satisfaction and engagement, leadership and management practices, compensation and benefits, and work-life balance. They found that job satisfaction and engagement were the most important factors in retaining healthcare employees.

A systematic review of the literature was also realised in the banking sector on employee retention, analyzing 33 articles published between 2009 and 2020 (Ullah *et al.*, 2021). The authors identified five main retention strategies: compensation and benefits, career development, work-life balance, leadership, and job design. They found that compensation and benefits were the most effective strategy for retaining employees in the banking sector.

A study was conducted for a systematic review of the literature on the role of leadership in employee retention, analyzing 72 articles published between 2011 and 2020 (Vidal-Suárez *et al.*, 2021). The authors identified three main leadership practices that contribute

to employee retention: supportive leadership, transformational leadership, and ethical leadership. They also proposed a future research agenda for exploring the impact of leadership on retention.

Asamani and Baah-Boateng (2021) presented a systematic review of the literature on employee retention strategies in small and medium-sized enterprises (SMEs), analyzing 35 articles published between 2000 and 2020. The authors identified six main retention strategies: training and development, work-life balance, compensation and benefits, organizational culture, leadership, and communication. They found that SMEs can effectively retain employees by offering training and development opportunities, promoting work-life balance, and creating a positive organizational culture.

In this study, the authors analyze how human resource practices influence employee retention in public sector organizations (Mubarik, Imran, 2021). The study was conducted based on a questionnaire applied to employees of 15 public sector organizations in Pakistan. The results show that recruitment and selection practices, development and training, and employee involvement are associated with higher employee retention. Similar results are obtained also by Yang *et al.*. (2021) on the impact of human resource practices on employee retention in the hotel industry in Taiwan. The study was carried out based on a questionnaire applied to the employees of 16 hotels. The findings show that development and training practices, compensation and benefits, and organizational communication are associated with higher employee retention.

The link between organizational culture and employee retention is analyzed through a systematic review and meta-analysis of studies published on this topic (Kim and Noh, 2021). The results show that positive organizational

culture is associated with higher employee retention. Also, certain dimensions of organizational culture have been identified that have a stronger connection with retention, such as open and transparent communication, respect and trust.

The research of Li *et al.* (2021) explores the relationship between work meaningfulness and employee retention over time, using longitudinal data from Chinese employees. The results suggest that work meaningfulness positively influences employee retention, and this relationship is strengthened over time. Also on this topic, with similar results is the study of Chiang and Yang (2021) which indicates, investigates using data from Taiwanese hotel employees, that workplace support and mentoring positively influence employee retention.

How organizational identification and job embeddedness influence employee retention during organizational change is detailed by Leung *et al.* (2021). The results indicate that both organizational identification and job embeddedness play important roles in employee retention during organizational change.

The role of employer branding, person-organization fit, and organizational support in retaining Generation Y employees, using data from Pakistani organizations is presented by Ali *et al.* (2021). The findings suggest that all three factors play important roles in retaining Generation Y employees.

Another research explores the role of employee well-being in the relationship between perceived organizational support and employee retention, using data from Taiwanese employees (Chen and Huang, 2021). The results suggest that employee well-being mediates the relationship between perceived organizational support and employee retention.

Park and Kim (2020) examined the relationship between turnover intention and actual turnover, and the mediating roles of job

satisfaction and organizational commitment in the process. The results indicated that job satisfaction and organizational commitment significantly mediated the relationship between turnover intention and actual turnover. The study suggests that organizations should focus on enhancing employee job satisfaction and organizational commitment to reduce employee turnover. Also, Luo *et al.* (2020) research the relationship between organizational justice, organizational identification, and employee turnover intentions from a social identity perspective. The results showed that organizational justice positively affected organizational identification, which in turn negatively affected turnover intentions. Also, leader-member exchange and job embeddedness are negatively related to turnover intentions (Kim, Hwang, 2020). The study suggests that organizations should focus on creating a fair and just work environment that fosters a sense of organizational identification to reduce employee turnover.

This study (Wang *et al.*, 2020) examined the impact of workplace stressors on employee

retention in the nursing profession. The results showed that workplace stressors, such as workload and work-family conflict, negatively affected employee retention. The study suggests that organizations should focus on reducing workplace stressors to improve employee retention in the nursing profession.

The role of psychological contracts and perceived organizational support in employee retention in the hospitality industry is studied by Rakić and Kovačević (2020). The results showed that both psychological contracts and perceived organizational support positively affected employee retention. The study suggests that organizations should focus on fostering a positive psychological contract and providing adequate organizational support to improve employee retention in the hospitality industry.

The relationship between flexible working arrangements and employee retention in a professional services firm is highlighted by Rathore (2020). The findings suggest that flexible working arrangements can have a positive impact on employee retention.

The results obtained by Yang and Co (2020) towards the relationship between transformational leadership, job satisfaction, affective

commitment, and voluntary turnover indicate that transformational leadership is negatively related to voluntary turnover, and this relationship is partially mediated by job satisfaction and affective commitment.

Related to leadership, the impact of leader-member exchange (LMX) is positively related to employee retention, and that job satisfaction moderates this relationship according to the study by Hunjra et al. (2020). They suggest that organizations should prioritize building high-quality relationships between leaders and their subordinates to retain their employees. According to He et al. (2020), employee engagement is positively related to job satisfaction and negatively related to turnover intention. Their research was made in the hospitality industry.

Razaque and Athar (2020) identify the key factors affecting employee retention in SMEs and suggest future research directions. They emphasize the importance of developing and implementing retention strategies tailored to the specific needs of SMEs. The role of trust and organizational justice in shaping employees' intentions to stay with their organizations is presented in the research of Pelikánová and Machková (2020). The authors find that employees' trust in their organization and perceptions of organizational justice are positively related to their retention intentions. They suggest that organizations should prioritize building trust and promoting justice to retain their employees.

A scientific article on the impact of workplace spirituality on employee retention in the Indian healthcare sector is made by Alam and Singh (2020). The authors find that workplace spirituality is positively related to employee retention. They suggest that organizations should promote workplace spirituality as a way to retain their employees.

The relationship between ethical leadership and employee creativity and the mediating

roles of knowledge hiding and psychological safety is presented by Yang *et al.*. (2019). The results suggest that ethical leadership has a positive impact on employee creativity and that knowledge hiding and psychological safety partially mediate this relationship.

Evidence from a large Chinese IT firm is taken to study and examines the relationship between organizational justice and innovative work behaviour, using sample of employees from a large Chinese IT firm. The results show that organizational justice positively affects innovative work behaviour and that this relationship is partially mediated by psychological empowerment (Han and Wang, 2019). In China, is made a study that explores the antecedents and consequences of employee engagement among hotel employees (Ren, Chadee, 2019). The results suggest that job autonomy, supervisor support, and training and development opportunities positively affect employee engagement, which in turn positively affects job satisfaction and organizational commitment.

Another study (Tymon, 2019) examines the relationship between employee psychological capital, service climate, and customer satisfaction in a service industry context. The results suggest that employee psychological capital has a positive impact on service climate, which in turn positively affects customer satisfaction.

The impact of organizational support for career development on career success, and the mediating roles of perceived organizational support, proactive personality, and gender are analyzed by Zhao *et al.* (2019). The results show that organizational support for career development has a positive impact on career success and that this relationship is partially mediated by perceived organizational support, proactive personality, and gender.

Job characteristics such as job autonomy, task significance, and feedback have a signifi-cant positive effect on employee retention (Choi *et al.*, 2019). Oni *et al.* (2019) examines the relationship between social support and employee retention in the Nigerian banking sector. The authors found that social support has a significant positive effect on employee retention and that social support can be enhanced through training and development programs.

The concept of job embeddedness and its relationship with employee retention. The authors found that job embeddedness is a significant predictor of employee retention and that interventions targeting job embeddedness can improve retention (Singh *et al.*, 2019).

Methods for Retention

Employee retention refers to an organization's ability to retain its employees, especially those who are highly skilled and qualified. High employee turnover can be costly for organizations, both in terms of financial resources and loss of talent and expertise. Therefore, organizations need to implement effective employee retention strategies to attract, engage, and retain their top talent.

There are several methods that organizations can use to retain their employees (Forbes, 2018):

1. Provide Competitive Compensation and Benefits: One of the most effective ways to retain employees is by offering a competitive salary and benefits package. This can include providing salaries that are in line with industry standards, offering health and wellness benefits, and providing retirement plans and other financial incentives. By offering a comprehensive package, employees are more likely to remain with the organization.

2. Create a Positive Work Environment: Organizations should strive to create a positive work environment where employees feel valued and supported. This can include offering flexible working arrangements, promoting work-life balance, recognizing and rewarding employees for their contributions, and fostering a culture of collaboration and teamwork.

3. Invest in Employee Development: Providing opportunities for employee development can increase job satisfaction and engagement, as well as make employees more valuable to the organization. This can include offering training and development programs, mentorship opportunities, and coaching sessions.

4. Offer Career Advancement Opportunities: Employees are more likely to remain with an organization if they see opportunities for growth and advancement. Organizations should provide clear career paths, offer promotions, and provide opportunities for employees to take on new responsibilities and challenges.

5. Improve Communication and Feedback: Open communication and feedback are critical for employee retention. Organizations should provide regular feedback to employees, listen to their concerns, and address any issues or challenges they may be facing. This can help build trust and improve employee morale.

6. Offer Work/Life Balance: Employees today are looking for a balance between their work and personal lives. Organizations can attract and retain employees by offering flexible work arrangements such as telecommuting or compressed work weeks. When employees have more control over their work schedule, they are more likely to be engaged and stay with the organization.

7. Foster a Culture of Diversity and Inclusion: Creating a culture of diversity and inclusion can be an effective way to retain employees. This includes promoting diversity in recruitment and retention efforts, providing opportunities for employees to participate in diversity and inclusion training, and promoting an inclusive environment that values different perspectives and experiences.

8. Recognize Employee Achievements: Providing regular recognition and rewards for employee achievements can help to foster a positive work environment and improve employee morale. This can include public recognition, bonuses, promotions, and other incentives.

9. Improve the Hiring Process: Organizations can retain employees by improving the hiring process to ensure that candidates are a good fit for the organization. This can include conducting thorough interviews, providing realistic job previews, and offering a comprehensive onboarding program.

10. Encourage Employee Feedback: Employees who feel their voices are heard and valued are more likely to be engaged and committed to their organization. Employers can retain employees by soliciting and acting on employee feedback through surveys, focus groups, and suggestion boxes. This can help to identify areas for improvement and make positive changes that increase employee satisfaction.

Overall, employee retention is critical for the success of any organization, and implementing effective retention strategies is essential to attract and retain top talent. By offering competitive compensation and benefits packages, creating a positive work environment, investing in employee training and development, and conducting regular feedback surveys, organizations can increase their employee retention rates and build a strong, skilled workforce.

Conclusions

One of the most effective ways is to offer competitive compensation and benefits packages. This can include offering salaries that are in line with industry standards, providing health and wellness benefits, and offering retirement plans and other financial incentives.

Another important retention strategy is to create a positive work environment that fosters employee engagement and satisfaction. This can include providing opportunities for professional development and growth, recognizing and rewarding employees for their contributions, and promoting a healthy work-life balance.

Organizations can also improve employee retention by investing in employee training and development programs. This can help employees develop new skills and knowledge, which can increase their job satisfaction and engagement, and make them more valuable to the organization.

In addition to these strategies, organizations can also conduct regular employee feedback surveys to better understand the needs and concerns of their employees. This can help organizations identify areas where they need to improve and take proactive measures to address employee concerns.
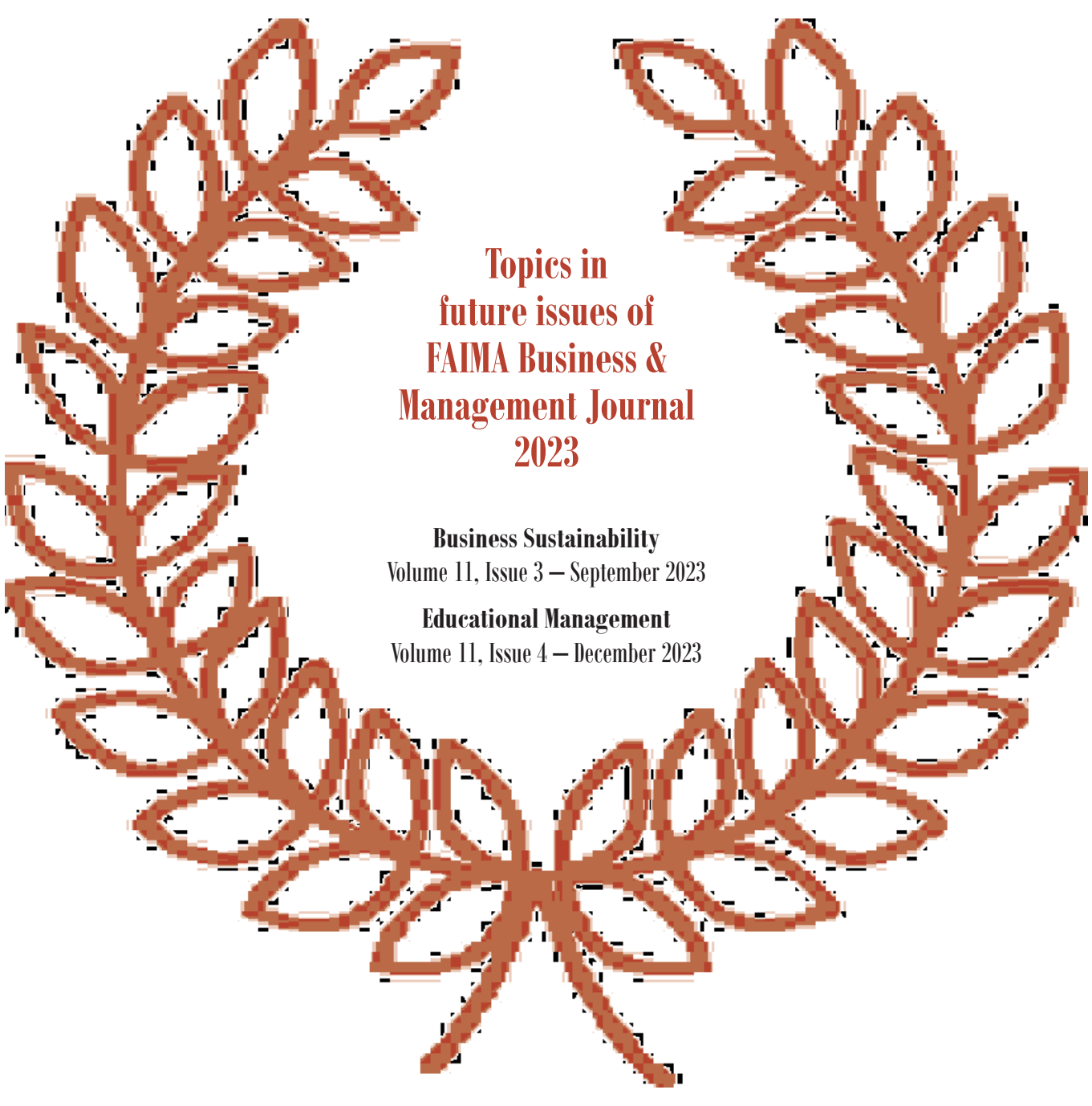
Acknowledgements

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„Good business decisions are based on data and not on gut feeling."
Rasmus Rothe
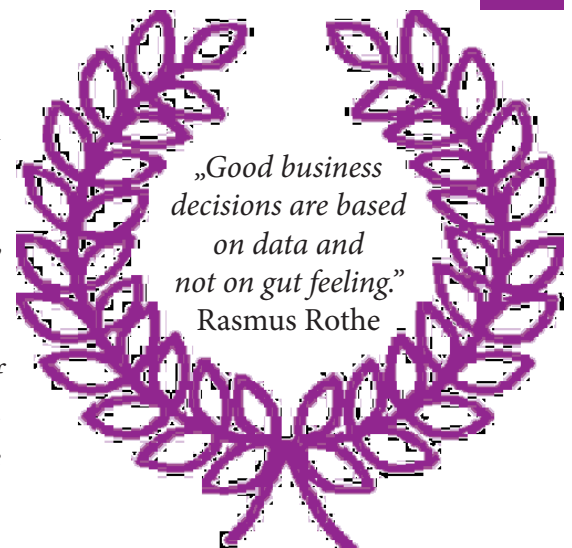
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