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# IT Services and Digital Transformation of the Romanian Society

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## ABSTRACT

*The activity of services rendered to enterprises is a relatively recent presence in the research and publications of the National Institute of Statistics. Until 1990, for ideological reasons, only the services provided to the population were partially registered. The first research had the year 2003 as a reference, and gradually the area of investigation expanded, parallel to the amplification of this activity in the economy. When it comes to the services, a significant share is held by the ICT group, which ended up holding about 6% of the GDP, a share that is approximately equal to that of the construction sector, thus placing Romania on an honourable fourth place in the European Union, this sector having real chances of growth in the future. Although the activity in the ICT sector is dynamic, the digitalization of the economy is strongly lagging behind, Romania being placed at the tail of the profile rankings made for Europe. The current e-government program in the EU (2015-2020) ends in 2020 and the implementation measures of the provisions of the Digital Agenda 2021-2027 are now being promoted. We analyse in the presented material the activity of the ICT sector reflected by pertinent indicators, with details on sub-activities of the field, while promoting some directions of action resulting from the analysis performed, to boost the activity in this field of strong economic and social interest.*

**Keywords:** Information and Communication Technology (ICT) sector, IT services, Digital Agenda

**JEL:** C01, K24, O33

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## 1. LITERATURE REVIEW ON THE DEFINITION AND CLASSIFICATION OF SERVICES AND ICT SECTOR

From the very beginning of modern economic science, the nature of economic activities known under the generic name of “services” identified distinctly from material goods has often generated theoretical disputes of identification and classification that have not been definitively resolved until now. Given this reality, Stigler’s observation (1956) is still valid: „*there is no*

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*authorized consensus either on the borders or on the classification of service branches*". In the 1960s, the American Marketing Association defined *services* as „*activities, benefits, or utilities that are offered in the marketplace or provided in association with the sale of a material good*". Bessom and Jackson (1975) provide a definition from the perspective of the service consumer. Gershuny (1983) considers that the term of services can be used in four different ways: *service industry, service-type of products, occupational services, function services*, as activities within the economy. We find an interesting approach in Harte and Dale (1995), which together with an original definition of services as "*intangible outputs, rather qualitative than quantitative*" is offering a perspective on management also. Itkonen (2015) conducts a study, based on a field research, in which it aims to validate the concordance between the definitions and the reality in the field. Sanders et al (2013) are the authors of a report in which a true radiography of the service system is made to US government institutions. Another definition of services is proposed by Hill (1999) starting from the distinction between products and services that has been traditionally interpreted by economists and investigates the origin of this approach following its evolution over two centuries. Regarding the volume of employment in the service sector, Maleyeff (2009) makes a real X-ray of the US services. The professional services provided to enterprises are the object of a vast work elaborated by the group Empson, Muzio et al (2015). Schmenner (1986) advocates the establishment of networks of service providing companies and Bell (2008) develops a comprehensive, coherent, guiding theory useful to all those working in the IT field. Blois (1991) defines the service as an activity that offers benefits, without necessarily implying an exchange of tangible goods. Jaakkola and Halinen (2006) highlight the organizational behaviour of companies in the service sector. For the first time services were grouped in a distinct sector of the national economy by Fisher (1939), which includes them in the tertiary sector, later the classification was perfected by Clark (1957) and Fourastie (1966). Another classification of services depending on their content, nature and characteristics is found in Judd (1964), and Rathmell (1974). Schmenner (1986) also proposes a classification depending on the degree of "provider-consumer" interaction. Other classification variants are provided by Vandermerwe and Chadwick (1989), Gronroos (2006) and Bhasin (2018). Figueiredo et al (2017) conducts a study based on an extensive documentation in the Web of Science, Scopus and SciELO databases that tracks business services. Larson (2008) used a database created for the analysis of 168 service processes, also launching the "*Service Science*" concept. Schettkat and Yocarini (2006) propose a structuring of the economy in the divisions of the sectors of economy in primary and tertiary. Professional services are treated analytically at the 23rd Annual IPSERA Conference (2014), focusing

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on business services, a topic developed in an extensive paper by Reihlen and Werr (2012). The specialization of services is developed online [48], Silvestro et al (1992) and Hill (1999) discuss and argue the need for a strategy on the development of service activities. Skjølsvik (2017) presents an integrated model of strategic management of professional services, whose volume, in the opinion of Pacheco (2020), will increase by over 5.0% by 2020, reaching almost 5 trillion dollars. Grönroos (2006) develops the specifics of service marketing, Leung and Bockstedt (2009) take an account of the most important categories of quantitative business analysis software applications, focusing on online analytical processing technologies (OLAP). We find another concern for a classification of services in Wemmerlov (1989), who capitalizes on a database of service processes by establishing significant similarities between different categories. An approach of the services based on the systems theory is performed by Polese et al. (2016) and Yitzhaki (1982) develops the issue of measuring displacements in the structure of services using the Gini indicator, the same topic being developed by Greselin and Zitikis (2018), Isaic-Maniu et al (2018) and Dragan et al (2017) in the analysis of the evolution of the structure of professional services in Romania. The topic of service economy is developed by Fuchs (1968) and Ashmarina et al (2020). A study on the state of digital governance in the EU [46], study that focuses on the analysis of the offer of information and communication technologies. Booth et al (2016) makes an exhaustive inventory on the impact of changes generated by amplifying the digitalization of economies. The importance of digitization and measuring the impact generated in society is a topic developed by Legner (2017), but also by Jocevski et al (2019). Gimpel et al (2018) conducts an assessment of the impact of digitalization on sales on the example of the company Zeiss. Greenstein (2013) analyses the impact of digitalization that has greatly transformed social interactions. A book that presents a rich real-world case study on digitization is that of Urbach (2018), aiming at disseminating knowledge and experience from organizations with achievements in digitizing the activity, while reflecting the many facets of digitization, also Urbach and Röglinger (2018) wrote a paper that aims at introducing the digitalization of economy.

## 2. METHODOLOGY AND DATA SOURCES

After identifying the relevant data sources for ICT services, they were systematized, homogenized, organized in comparable series so as to allow the characterization by appropriate indicators of the sector's activity, identifying a trend of evolutions for possible predictions, respectively establishing correlations with other macroeconomic indicators to be able to identify possible lever actions to boost the development of this sector.

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The main sources were the statistical ones, extracted from the publications of the National Institute of Statistics of Romania (INS), and the financial ones from the publications of the National Bank of Romania (BNR) and of the Ministry of Public Finance (MFP), mainly the following:

- Data on *Turnover (CA)* from the statistical survey *Annual Statistical Survey* in enterprises (ASA);
- Short-term indicators in services (SERVTS);
- Statistical Yearbook of Romania - series, 2020, INS;
- Results and performances of enterprises in trade and services, 2019;
- Public access to information and communications technology, 2010-2019;
- Statistical information, Business statistics series, Business services activity, Successive series 2010-2019;
- Statistical information, Enterprise Statistics Series, Information Society, Successive Editions 2010-2019;
- Small and medium-sized enterprises in the Romanian economy, 2017, 2019 Edition, INS;
- Romania in figures, 2017, 2018 edition, INS;
- Romania in the European Union, 2017, 2018 edition, INS;
- TEMPO online database, PSC 108 G/H/I/, INT 109 A/B/C/;
- Balance of payments and international investment position of Romania - Annual report 2017, BNR;
- Other sources from MFP, BNR etc. specified locally.

### **3. CHARACTERISTICS OF THE PROFESSIONAL SERVICES ACTIVITY**

A total of 224,292 enterprises providing services operate in the Romanian economy, their picture is very diverse, so that 91.3% of the total are micro-enterprises and only 0.25% large enterprises, but they employ almost 33% of the total staff employed, and contributes by 31.4% to the total turnover. The average turnover per enterprise is 1,117.77 thousand lei, but large enterprises achieve a turnover about 135 times higher. From the point of view of labour productivity calculated on the basis of turnover, the average level is 184.5 thousand lei/employee, the highest value being registered in the category of small enterprises, with 212.6 thousand lei/employee, large enterprises achieve a volume of exports of 163 lei per 1000 lei turnover, compared to 80 lei achieved by micro-enterprises, where the gross value added is accounted per 1000 lei. The turnover was 415 lei, in the range 319 lei/1000 lei turnover for small enterprises and 513 lei in the case of large

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enterprises. The gross value added per employee was at the sector's level of 76.5 thousand lei/employee, the gap between micro and large enterprises being only 1.3 times, while the staff gap on an employee is 2.6 times in favour of large enterprises.

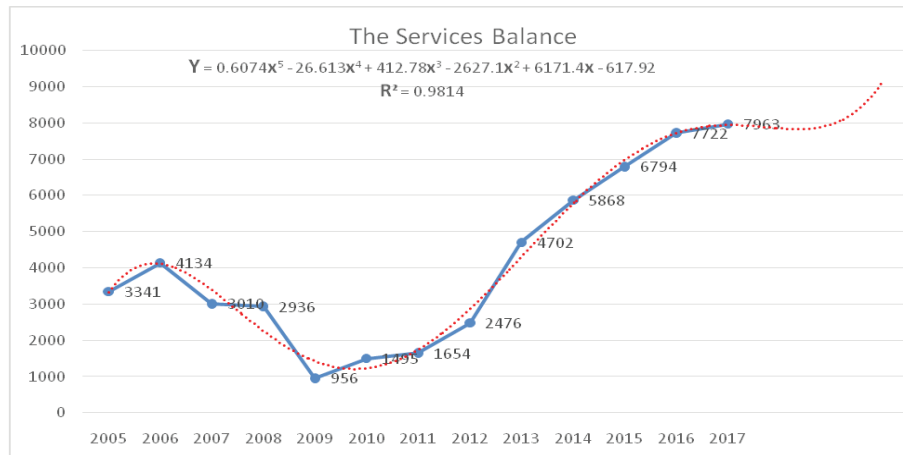
A positive impact of the service activity is found in Romania's international trade relations. If the balance of goods registered a negative balance of 12,183 million euros, increasing by 30.9% compared to the previous year, exports increased by 9.6% and imports by 12.8%. The share of the goods balance deficit in the GDP increased by 1 percentage point, to 6.5%. By comparison, the balance of services registered for 2017 a surplus of 8,210 million euros (4.4% of the GDP), compared to 7,723 million euros (4.5% of the GDP) in the previous year, on the background of increased revenues from goods processing services, IT services, road freight transport, financial and construction services.

In 2017, the current account deficit continued to deepen: 6.464 billion euros compared to 3.499 billion euros in 2016. As a share of GDP, the current account deficit increased from 2.1% to 3.5%, the second largest in the European Union, after the United Kingdom. The services also contributed this year to moderate the deterioration of the balance, generating a surplus of 7.963 billion euros, equivalent to 4.3% of the GDP. In other words, without this positive contribution from services, the current account deficit would have reached over 14.4 billion euros or 7.8% of the GDP. After the records from the pre-crisis period were exceeded in 2013, both in terms of exports of services and the positive balance of services, in 2017 new highs were recorded. Throughout the period 2005-2017, the positive balance of services increased by 138%. The greatest progress in this balance is registered in: IT services, transport and other business services (research and development, professional consultancy, technical and commercial services etc.), telecommunications, IT and information services, goods processing. The four branches together contribute to about 82.5% of total exports of services, by about two percentage points less than in the previous year).

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## The trend of the services balance and forecast for the next three years

Figure 1



Source: Author's calculation

The trend of the services balance and the forecast for the next three years was best modelled by a grade 5 parabolic model, shown in Figure 1. The forecast for the next three years indicates a possible increase in this positive balance.

## 4. CHARACTERIZATION OF THE ICT SECTOR

### 4.1. Evolution and share of the activities

The Information and Communications sector includes, according to the NACE Rev.2 classification, group J NACE codes 62 and 63. In recent years, Romania is considered as a country favourable to the development of ICT centres, with a well-qualified workforce available here and still cheap enough. Costs are also an advantage in terms of office space and logistics in general, including high speed internet access. According to SpeedTest (<https://www.speedtest.net/>), Romania ranks 5th in the world in broadband. The tax advantages granted to ICT companies have generated an energetic development of the sector, so that it has become, in recent years, among the most dynamic in the national economy. Moreover, 4G connectivity started faster in Romania compared to other European countries, and there are currently advanced preparations for the transition to 5G.

At national level, in 2017, it is noted that the largest share in the turnover of the services sector rendered to enterprises is held by enterprises

having the main activity of „Informatics and related activities”, respectively 50.4% of total turnover obtained in the total of services for enterprises. Following that, in table 1, the main categories of activities of this sector are detailed.

### Information technology and related activities

Table 1

<i>Indicators</i>	<i>2017 (mil lei)</i>	<i>Structure (%)</i>
Total turnover, of which:	18,822	100.0
- IT programming services	7,966	42.3
- information technology consultancy services	3,311	17.6
- other information technology services	887	4.7
- data processing and hosting services	866	4.6
- computer game editing services	251	1.3
- development of other software packages	3,356	17.8
- sale of hardware and software products	537	2.9

Source: Statistical Information, Enterprise Statistical Series, INS, 2019, page 3

The IT services sector is marked by both a general increase in the market and in the degree of concentration. The number of companies registered a constant and significant increase in the analysed period, from 6,600 in 2010 to 10,947 in 2017. The main 10 competitors are holding a share of 25.3% of the sector's sales in 2017 compared to 12.7% in 2008, indicating the accentuation of the concentration process.

### Potential indicators for the main activities of the ICT sector

Table 2

<i>Indicators</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>	<i>2013</i>	<i>2014</i>	<i>2015</i>	<i>2016</i>	<i>2017</i>
Total number of active companies	7,304	7,060	6,600	6,811	7,270	7,664	8,113	8,605	9,581	10,947
Average number of employees	51,194	35,656	36,616	41,044	47,384	52,475	57,367	68,145	75,932	84,019
Turnover (mil. Euro)	1,793.9	1,632.8	1,810.3	1,907.3	2,188.9	2,436.2	2,842.0	3,391.6	3,653.7	4,065.3
Turnover/employee (thousand Euro/year)	35.041	45.794	49.441	46.470	46.195	46.427	49.541	49.,771	48.118	48.385

Source: Determined based on AEEF Trends et Analysis, AEEF# 62XX, Information technology service activities ([http://daeef.ase.ro/Media/Default/Studii%20-%20Cercetare/AEEF\\_69.pdf](http://daeef.ase.ro/Media/Default/Studii%20-%20Cercetare/AEEF_69.pdf))

The evolution of the potential indicators for the period 2008-2017 is presented in table 2. In 2009 and 2010 the number of companies decreased by



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244, respectively 460, representing a decline of 3.3% and 6.5%, the trend later becoming particularly increasing. For example, in 2017 there was an addition of 1366 companies (increase of 14.3%).

The average growth rate of the number of employees in the entire ICT sector was 6.8% throughout 2008-2017, with a drastic decrease in 2009, of 30.4%, a timid return in 2010 (2.7 %), the pace of changes then remaining high throughout the analysed period of time.

The sales volume in this sector exceeded 4 billion Euros in 2017, being 2.3 times higher compared to the one of 2008, when a cumulative turnover of 1.8 billion Euros was registered. The average annual growth rate of sales in this sector was 9.8% in the period 2008-2017, one of the highest compared to other economic sectors.

In the total turnover, the NACE activity 6201 – computer programming activities had the highest share, of about 68%, compared to 50.2% in 2008. The increase was at the expense of other two components, such as the “Computer consultancy activities” (6202), which reduced its share from 32.1% to 23.6%, and the “Other information technology and computer service activities” (6209), which reduced its share from 17.2% to 8.5% in the period 2008-2017. The volume of assets in this sector is 2.5 billion Euros, with an average annual increase of 9.6% in the last decade.

The average growth rate of turnover exceeds by 25% the growth rate of the number of employees in 2017, and the dynamics of turnover of 11.3% indicates a sustained increase in labour productivity. As of end 2017, the sector of software production and other information technology services included nearly 11 thousand operational companies. The ICT sector presented in 2017 the characteristics of a booming sector, the turnover growth rate in the industry being almost 10% annual average in the last decade.

The IT services sector is marked by a general increase in the market, but also in the degree of concentration. The number of operational companies registered a constant and significant increase in the analysed period of time, from 6,600 in 2010 to 10,947 in 2017. The efficiency analysis in this sector highlights an increase in labour productivity in the analysed period, the turnover per employee increasing from 35.0 thousand Euro/year to 48.4 thousand Euro/year in 2017.

#### **4.2. Market structure of the ICT sector**

The evolution of competition in this sector is particularly strong, as illustrated by an increase in the degree of concentration in the last ten years. The first 10 companies held in 2008 a share of 12.7% of this sector’s turnover, to reach 25.3% in 2017. Practically, the degree of concentration doubled over



the analysed period, where the 10 most important companies, respectively 0.1% of the number of companies provide 25% of turnover in 2017.

The first three companies in this sector are: Oracle Romania SRL (5.5% market share in 2017, level similar to that of 2014-2016), IBM Romania SRL (4.9% market share similar to that of the last three years) and Ericsson Telecommunications (4.0% market share decreasing compared to 4.4% in 2016), and we expect to register significant changes in the positions on the Romanian IT market in the following years. National companies such as Siveco Bitdefender, SAP and Endava are also significant presences.

In 2017, labour productivity had a median of about 58 thousand Euros sales /employee in the case of the most important companies, above the average level of the 11 thousand companies amounting to 48 thousand Euro per employee.

#### 4.3. Econometric modeling of digitalization impact in the economy

The data set used in the econometric analysis is presented in table 3, and based on them, those regression models that are statistically significant will be compiled, tested, validated, selected and retained, on which basis directions of action to boost the development of the sector can be established.

#### Indicators used for digitalization impact analysis

Table 3

Indicator	GDP growth	Turnover growth	Employees growth	GDP per capita growth	GDP (billion lei)	Turnover (mil euros)	Number of Employees	Assets (mil euros)	GDP per capita
2008	-	-	-	-	670.6	1793.9	51194	1098.6	26284.9
2009	0.929	1.047	0.696	0.992	623.0	1632.8	35656	1121.0	26065.8
2010	0.992	1.101	1.027	1.001	618.0	1810.3	36616	1359.4	26090.4
2011	1.011	1.061	1.121	1.064	624.8	1907.3	41044	1469.9	27757.3
2012	1.006	1.207	1.154	1.066	628.5	2188.9	47384	1744.7	29598.1
2013	1.034	1.104	1.107	1.074	649.9	2436.2	52475	1746.0	31790.9
2014	1.028	1.173	1.093	1.056	668.1	2842.0	57367	1851.7	33569.7
2015	1.040	1.193	1.188	1.071	712.7	3391.6	68145	2085.3	35948.9
2016	1.048	1.088	1.114	1.080	762.3	3691.6	75932	2264.6	38826.5
2017	1.069	1.132	1.107	1.126	858.3	4065.3	84019	2473.0	43729.1

Source: Determined based on different publications

The models generated based on the data (table 3) with statistical significance were:

1. The model with the outcome variable GDP, depending on the turnover (T), number of employees (E) and assets (A);
2. GDP growth (i\_GDP) depending on the turnover growth (i\_T) and employees' growth (i\_E);
3. GDP per capita growth (i\_GDPpc) depending on the turnover (T), number of employees (E) and assets (A);
4. GDP per capita growth (i\_GDPpc) depending on the turnover growth (i\_T) and employees' growth (i\_E).

The summary of the results is shown in Table 4, where only the models with a correlation coefficient of over 70% were retained, respectively a coefficient of determination of over 50%.

### Comparative presentation of models

*Table 4*

<i>Model</i>	<i>Adjusted R-squared</i>	<i>R</i>
$GDP=470.32+0.040*T+0.004*E-0.07*A$	0.8558	0.9507
$i\_GDP=0.852-0.096*i\_T+0.255*i\_E$	0.7142	0.8452
$i\_GDPpc=12542.77+3.88*T+0.072*E+3.166*A$	0.9804	0.9901
$i\_GDPpc=0.9063-0.068*i\_T+0.215*i\_E$	0.5124	0.7103

*Source: Author's calculation*

Following the analyses carried out, three scenarios for the evolution of the ICT sector have been contemplated: starting from the growth rate of the Gross Value Added (GVA) registered in 2016, the share of the sector in the GDP will reach 12% and, if the pace recorded in the last five years will be maintained, the share of this sector in the GDP will approach 10%.

Evaluations of specialized companies were made, for example, in the study “Software and IT services in Romania” of 2018 presented by the Employers’ Association of the Software and Services Industry, ANIS [45].

## 5. DIGITAL GOVERNANCE IN ROMANIA

Digital governance consists of the interaction between government, parliament and other public institutions with citizens through electronic means. Information on the bills under discussion and the issuance of opinions by citizens, the payment of taxes by taxpayers, the filling of online applications are effective means provided by the state for the exercise of the fundamental rights of citizens.

After 1990, information and communication technologies (ICT) led to an increase in national productivity and at EU level, where the technological “convergence” blurred the boundaries between telecommunications, broadcasting and IT. Following the Lisbon Strategy, the Digital Agenda for

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Europe (EDA) was conceived as a pilot initiative of the Europe 2020 strategy, to give consumers and businesses better access to digital goods and services across Europe and to offer the EU an advanced system of user rights and user protection, including lower prices for electronic communications and the end of roaming charges.

With regard to the degree of computerization of the society at international level, there is a series of studies that consider digital governance as being one of the evaluated components. The most relevant studies are:

- *The UN study*, which measures the efficiency of e-governance through a composite index (EGDI), determined as a weighted average of the indicators of telecommunications infrastructure, human capital and online services;
- *The method proposed by the European Commission* also in the form of a composite index of the digital economy and society (DESI); bringing together relevant indicators on digital performance, such as Connectivity (broadband services, speed and prices of broadband connection); Human capital (internet use, digital skills); Internet use (population access to the internet, online transactions); Integration of digital technology (digitization of enterprises and e-commerce), Digital public services (e-governance).
- *The IMD World study* [47] on the digital competitiveness of 63 economies, synthesizing three elements: knowledge for digital change in the economy, the technological factor and the ability to implement new digital technologies.

Romania is among the last countries in the rankings, as follows: 67th place out of 193, according to the EGDI study, but last among EU countries, on the 28th place out of 28, according to DESI report and on the 54th place out of 63, according to the IMD World report, respectively on the penultimate place in the EU.

Within the European Union, a phase report on the digital economy within the Union (EDPR-Digital Economy and Society Index-DESI) was prepared in 2017 to assess Member States' progresses in digitizing the economy.

## 6. CONCLUSION AND PERSPECTIVES

In 2015, a government program with the title: Digital Agenda [49] was adopted, having the major objective of computerizing the economy, but compared to the targets set for 2020 the gap is very large, and the progress recorded between 2016 and 2017 is modest compared to the objectives set

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in the strategy, which ends in 2020. Among the main provisions in the field of administration we mention: improving access to information and services provided by public administration authorities; reorganization and restructuring and simplification of administrative processes; improving the exchange of information and services between public authorities; improving the quality of public services, promoting accountability, efficiency and transparency of the public services provided. As stated in the study “Software and IT services in Romania” [45], published by the Employers’ Association of the Software and Services Industry (ANIS), the simulations on the prospects of increasing the share of gross value added (GVA) in the sector “Information and Communications” in the nominal GDP at 12% indicates the possibility of reaching this value, if this sector maintains its remarkable evolution in the last 3 years, over the next 9 years. In this case, the contribution to the GDP growth would double, reaching 1.5 percentage points, compared to 0.7 percentage points in 2016. In 2017, the Romanian Academy published the paper Romania’s Development Strategy for the next 20 years [51], in which Project no. 4 aimed at computerization and cyber security, establishing the following as being necessary: actions for the development of the digital and digital knowledge society, increasing the digital competences of the population, increasing the contribution of research to the generation of knowledge elements and enhancing infrastructure in all fields.

Starting with 2021, Europe will move to another level, according to the objectives of the Digital Agenda 2021-2027, the main objectives being [50]: the realization of high-speed and high-capacity supercomputers, the incorporation of artificial intelligence in products and services, the increase of cyber security, intensification and increasing the level of digital education of the population, expanding the application of digital techniques in administration.

#### References

1. **Ashmarina, S. I., Mesquita, A., Vochozka, M. (Eds.)** 2020 *Digitalization and the economy - challenges and opportunities*, vol 908, Springer International Publishing, Switzerland AG
2. **Bell, M.** 2008 *Service-Oriented Modeling: Service Analysis, Design, and Architecture*, Hoboken, N.J.: John Wiley & Sons
3. **Bessom, R. M., Jackson, D.W.** 1975 *Service Retailing – A strategic Marketing Approach*, Journal of Retailing, 8, 137-149
4. **Bhasin, H.** 2018. *The influence of culture on consumer behavior*, Marketing91. Available at: <https://www.marketing91.com/the-influence-of-culture-on-consumerbehavior/>
5. **Blois, J. K.** 1991 *Product Augmentation and Competitive Advantage*, Journal of General Management, 16(3), 29
6. **Booth, A., Mohr, N., Peters, P.** 2016 *The digital utility: New oportunities and challenges*, McKinsey & Company
7. **Clark, H. J.** 1957 *Farm Management Research Data Needed for Extension*, Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie, Volume 5, Issue 1, pp.89-95

- 
8. **Dragan, I. M., Isaic-Maniu, A.** 2017 *An Alternative for Indicators that Characterize the Structure of Economic Systems*, *Entropy*, 19(7), 346
  9. **Empson, L., Muzio, D., Broschak, J. P., Hinings, C. R.** 2015 *Researching Professional Service Firms: An Introduction and Overview*, Publisher: Oxford University Press
  10. **Figueiredo, R., Neto, J. V., Quelhas, O. L. G., de Matos Ferreira, J. J.** 2017 *Knowledge Intensive Business Services (KIBS): bibliometric analysis and their different behaviors in the scientific literature: Topic 16 – Innovation and services*, *RAI Revista de Administração e Inovação*, Volume 14, Issue 3, 216-225
  11. **Fisher, G.B.A.**,1939, *Production, Primary, Secondary and Tertiary*, *The Economic Record*, vol. 15, issue 1, pp.24-38
  12. **Fourastié, J.** 1963, *Le grand espoir du xxe siècle*, 1<sup>a</sup> ed., Presses Universitaires De France, *Revue française de sociologie*, 4-2, pp. 224-225
  13. **Fuchs, R., V.**, 1968, *The Service Economy*, NBER, Cambridge, MA
  14. **Gershuny, J.** 1983, *Social Innovation and Division of labor*, Oxford Univ. Press, pp.191
  15. **Gimpel, H, Hosseini S, Huber, R., Probst, L., Roglinger, M., Faisst, U.**, 2018, *Structuring Digital Transformation: A Framework of Action Fields and its Application at ZEISS*, *Journal of Information Technology Theory and Application*, 19(1), 3
  16. **Greselin, F., Zitakis, R.** 2018, *From the Classical Gini Index of Income Inequality to a New Zenga-Type Relative Measure of Risk: A Modeller's Perspective*, *Econometrics*, 6(1), 4
  17. **Greenstein, M. S.**, 2013, *The Economics of Digitization*, Edward Elgar, Verlag
  18. **Grönroos, C.**, 2006, *Adopting a service logic for marketing*, *Marketing Theory*, vol.6, no3, 317-333
  19. **Harte, G. H., Dale, G. B.** 1995, *Improving quality in professional service organizations: a review of the key issues*, *Managing Service Quality: An International Journal*, 5(3), 34-44
  20. **Hill, T. P.** 1999, *Tangibles, Intangibles and Services: A New Taxonomy for the Classification of Output*, *Canadian Journal of Economics*, Vol. 32, No. 2, pp. 426-446
  21. **Isaic-Maniu, A., Bodea, N.**, 2018, *Structural Changes of Services Rendered to Enterprises in Romania, during 2008-2016*, *Proceedings of ESPERA, INCE*.
  22. **Itkonen, M.**, 2015, *Analyzing the Technical Structure of Service Product*, Master's Thesis Industrial Engineering and Management Degree Programme in Process Engineering, University of Oulu, Finland.
  23. **Jaakkola, E., Halinen, A.**, 2006, *Problem solving within professional services: Evidence from the medical field*, *International Journal of Service Industry Management*, 17(5), pp. 409-429
  24. **Jocevski, M., Arvidsson, N., Miragliotta, G., Ghezzi, A. and Mangiaracina, R.**, 2019, *Transitions towards omni-channel retailing strategies: a business model perspective*, *International Journal of Retail & Distribution Management*, Vol. 47 No. 2, pp. 78-93
  25. **Judd, C. R.**, 1964, *The Case for Redefining Services*, *Journal of Marketing*, 28(1), pp. 57-69
  26. **Larson, C. R.**, 2008, *Service science: At the intersection of management, social, and engineering sciences*, *IBM Systems Journal*, 47(1), pp. 41-51
  27. **Legner, C., Eymann, T., Hess, T. et al.**, 2017, *Digitalization: Opportunity and Challenge for the Business and Information Systems Engineering Community*. *Bus Inf Syst Eng*, 59, 301–308
  28. **Leung, T. Y., Bockstedt, J.**, 2009, *Structural Analysis of a Business Enterprise*, *Service Science*, 1(3), pp.169-188
  29. **Maleyeff, J.**, 2009, *Analysis of Service Processes Characteristics across a Range of Enterprises*, *Journal of Service Science and Management*, Vol. 2 No. 1, pp. 29-35
  30. **Pacheco, A.**, 2020, *Professional Services Trends to Look Out for in 2020*, Available at: <https://www.wrike.com/blog/professional-services-trends-to-look-out-for-in-2020/>
-

- 
31. **Polese F., Tommasetti A., Vesci M., Carrubbo L., Troisi O.**, 2016, *Decision-Making in Smart Service Systems: A Viable Systems Approach Contribution to Service Science Advances*. In: Borangiu T., Dragoicea M., Nóvoa H. (eds) Exploring Services Science. IESS 2016. Lecture Notes in Business Information Processing, vol 247. Springer, Cham
  32. **Rathmell, J.**, 1974, *Marketing in the service sector*, Cambridge, Mass: Winthrop Publishers
  33. **Reihlen, M., Werr, A.**, 2012, *Handbook of Research on Entrepreneurship in Professional Services*, Edward Elgar Publishing
  34. **Sanders, G., Ellman, J. E., Berteau, D. J., McCormik, R., Dadsetan, A.**, 2013, *Structure and Dynamics of the U.S. Federal Services Industrial Base, 2000-2012*, Center for Strategic and International Studies-CSIS, New York
  35. **Schettkat, R., Yocarini, L.**, 2006, *The shift to services employment: A review of the literature*, Structural Change and Economic Dynamics, 17(2), pp. 127-147
  36. **Schmenger, W. R.**, 1986. *How can service businesses survive and prosper*, Sloan Management Review, 27(3), pp. 21-32
  37. **Silvestro, R., Fitzgerald, L., Johnston, R.**, 1992, *Towards a classification of service processes*, International Journal of Service Industry Management, 3(3), pp. 62-75
  38. **Skjølsvik, T.**, 2017, *Strategic management of professional service firms: Reviewing ABS journals and identifying key research themes*, Journal of Professions and Organization, 4(2), 203–239
  39. **Stigler, G. J.**, 1956, *Factors in the Trend of Employment in the Service Industries*, Chapter in: Trends in Employment in the Service Industries, pages 157-166, NBER
  40. **Urbach, N.**, 2018, *Digitalization Cases, How Organizations Rethink Their Business for the Digital Age*, Springer
  41. **Urbach, N., Röglinger, M.**, 2018, *Introduction to Digitalization Cases: How Organizations Rethink Their Business for the Digital Age*, Research Center Finance & Information Management, Springer International Publishing
  42. **Vandermerwe, S., Chadwick, M.**, 1989 *The Internationalisation of Services*, Service Industries Journal, 9(1), pp79-93
  43. **Wemmerlov, U.**, 1989, *A taxonomy for service processes and its implications for system design*, International Journal of Service Industry Management, 1(3), pp. 20-40
  44. **Yitzhaki, S.**, 1982 *Stochastic dominance, mean variance, and Gini' mean difference*, American Economic Review, 72(1), 178-185
  45. Asociația patronală a industriei de software și servicii (ANIS), 2019, *Software and IT services in Romania*, Available at: <https://anis.ro/resurse/> (accessed May 2020)
  46. European Commission, 2019, *Prospective Insights in ICT R&D (PREDICT)*, Available at: <https://ec.europa.eu/jrc/en/predict/ict-sector-analysis-2019> (accessed May 2020)
  47. European Commission, 2017, *Europe's Digital Progress Report 2017*, Available at: <https://ec.europa.eu/digital-single-market/en/news/europes-digital-progress-report-2017> (accessed May 2020)
  48. Franck, R., 2020, *The Future of the Professional Services Industry*, Available at: <https://www.blog.consultants500.com/professional-services-in-general/the-future-of-the-professional-services-industry/> (accessed May 2020)
  49. Guvernul României, 2015, *Agenda Digitală*, Available at: <https://www.comunicatii.gov.ro/agenda-digitala-pentru-romania-2020/> (accessed May 2020)
  50. The European Institute of Innovation and Technology (EIT), 2017, *Horizon Europe Framework Programme for Research and Innovation 2021-2027*, Available at: <https://eit.europa.eu/who-we-are/eit-glance/eit-strategy-2021-2027> (accessed May 2020)
  51. The Romanian Academy, 2018, *Strategia de dezvoltare a României în următorii 20 de ani*, Available at: <https://acad.ro/bdar/strategiaAR/doc14/Strategia-Sinteza.pdf> (accessed May 2020)
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