Годишник на
Висше училище
по телекомуникации и пощи
том V

2021
Годишникът на Висше училище по телекомуникации и пощи (ВУТП) е научно издание, което се издава веднъж годишно (през м. Ноември) и е със свободен достъп до публикуваното съдържание, което преди да бъде публикувано преминава през процес на двойно-анонимно рецензиране. Мисията на Годишника е да се превърне в международен форум за широко разпространение на научни статии, съдържащи само оригинални научни приноси и достижения на академичния състав на висшето училище, в обхвата на присъщата му научна дейност. В Годишника се насърчават да публикуват автори и авторски колективи, както от академичната общност на висшето училище, така и на автори извън него, участващи със статии, посветени на стойностни теоретични, емпирични и методологични изследвания, в обхвата на основните научни области на компетентност на Висше училище по телекомуникации и пощи.

РЕДАКЦИОЕН СЪВЕТ:
Президент:
проф. д-р Миглена Темелкова (Ректор на ВУТП)
Членове:
проф. д-р инж. Димитър Дамянов – ТУ София
проф. д-р Павел Павлов – ВСУ „Черноризец Храбър”
доц. д-р инж. Пламен Павлов – ВУТП
доц. д-р инж. Ирина Топалова - ВУТП
доц. д-р Ивайло Стоянов – ВУТП
доц. д-р Валери Гочев – ВУТП
ас. д-р Виктор Гладченко – ВУТП

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Problems of the Logistics Services in the Republic of Bulgaria

Plamen Pavlov\textsuperscript{1}


Keywords – air, rail and road transport, multimodal transport, influence of Covid-19.

I. INTRODUCTION

Over the past two years, the Bulgarian and world economies have experienced and continue to feel the effects of the serious economic crisis associated with the emergence and impact of the SARS-Cov-2 virus. The introduction of anti-epidemic measures, including Lockdown, in a number of cities, regions and entire countries has had a negative impact on economic and trade activity. This situation has had the greatest impact on logistics services and logistics in general. This has had the most serious impact on the tourism industry, which has led to a drastic decline in the transport of tourists by air and road. The impact of the crisis on air transport is shown in Table I. and the analysis accompanying it.

### Table I

<table>
<thead>
<tr>
<th></th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passengers - number</td>
<td>12,044,306</td>
<td>3,874,985</td>
</tr>
<tr>
<td>Arrived</td>
<td>6,003,406</td>
<td>1,929,291</td>
</tr>
<tr>
<td>Departed</td>
<td>6,040,900</td>
<td>1,945,694</td>
</tr>
<tr>
<td>Cargo - tons</td>
<td>28,789</td>
<td>25,972</td>
</tr>
<tr>
<td>Unloaded</td>
<td>11,497</td>
<td>10,568</td>
</tr>
</tbody>
</table>

There is a drastic reduction in the number of passengers served at Bulgarian airports - from 12,044,306 to 3,874,985, which is mainly due to anti-pandemic measures and lockdowns announced by the countries with which we have the most significant air traffic exchange. Our Black Sea resorts and the tourist businesses based in them have suffered the most, because for them sea and road transport are not an alternative. Losses were also accumulated by airports and their supporting structures, as well as operators from uncollected airport fees and other service charges.

Against the backdrop of the extremely poor results in passenger transport segment, the transport of goods by airlines and airport infrastructures performed much better, with a reduction of 9.78%.

The transport of goods by air carriers as part of multimodal transport is very limited and Bulgaria cannot effectively use its airport infrastructure and become more actively involved in international logistics chains and networks.

II.

The impact of the economic crisis and the ensuing recession caused by SARS-Cov-2 on maritime transport activities are listed in Table II and the analysis to it.

### Table II

<table>
<thead>
<tr>
<th></th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>30,997</td>
<td>25,258</td>
</tr>
<tr>
<td>Imports - unloaded (thousand tons)</td>
<td>14,770</td>
<td>12,535</td>
</tr>
<tr>
<td>Exports - loaded (thousand tons)</td>
<td>16,227</td>
<td>12,723</td>
</tr>
</tbody>
</table>

Maritime transport activities also saw a decline in traffic, but not to the same extent because passenger traffic was absent and the pandemic did not affect international freight to such an extent. Bulgarian seaports are used mainly for bulk cargo, including cereals.

Unfortunately, due to the sanctions imposed on the Russian Federation and the economic crisis in Ukraine and Georgia, the use of ferries is limited, which greatly complicates multimodal transport, including rail cars.

The impact of the economic crisis as a result of the SARS-Cov-2 pandemic on maritime transport activities is listed in Table III. and the analysis to it.

### Table III

<table>
<thead>
<tr>
<th></th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>4,038</td>
<td>3,815</td>
</tr>
<tr>
<td>Imports - unloaded (thousand tons)</td>
<td>1,497</td>
<td>1,294</td>
</tr>
<tr>
<td>Exports - loaded (thousand tons)</td>
<td>1,471</td>
<td>1,711</td>
</tr>
<tr>
<td>Coastal (thousand tons)</td>
<td>1,070</td>
<td>810</td>
</tr>
</tbody>
</table>

\textsuperscript{1} Plamen Tzvetanov Pavlov is with the University of Telecommunications and Post, Sofia, 1 Acad. St. Mladenov Str, Sofia 1700, Bulgaria. E-mail: dean@utp.bg.
There has also been a general decline in river transport activities but, mainly due to the low base, the results are not so bad. The port infrastructure of river ports is obsolete, there is a lack of investment and practically multimodal transport is extremely limited and almost non-existent.

The impact of the economic crisis on railway transport activities is shown in Table IV and the analysis accompanying it.

### Table IV

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight transported (thousand. tons), of which:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>domestic transport</td>
<td>9,893.4</td>
<td>9,906.2</td>
</tr>
<tr>
<td>international transport</td>
<td>5,054.7</td>
<td>6,467.4</td>
</tr>
<tr>
<td>Work performed – mil. km, of which:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>domestic transport</td>
<td>3,901.6</td>
<td>4,502.8</td>
</tr>
<tr>
<td>international transport</td>
<td>2,524.2</td>
<td>2,803.8</td>
</tr>
<tr>
<td>Total</td>
<td>13,774.6</td>
<td>13,900.0</td>
</tr>
</tbody>
</table>

rail freight in the country and internationally is growing, which is positive in the context of a pandemic and a crisis, despite the low base against which the results are reported. Significant investments under European programmes in railway infrastructure and increased traffic to the Middle East thanks to the well-functioning tunnel under the Bosphorus in the Republic of Turkey.

The transport of goods by rail is still not an essential part of the international logistics systems and chains of multimodal transport in the country and abroad.

The impact of the economic crisis and the ensuing recession on road transport activities are listed in Table V and the analysis accompanying it. Unlike other modes of transport, domestic road freight transport increased from 96,205.9 thousand tons in 2019 to 105,883.0 thousand tons in 2020 and from 5,719.3 mil. tkm in 2019 to 7,409.3 mil. tkm in 2020 due to long-term supply contracts and increased volumes of supplies of goods generated by online retailers. Against the backdrop of the pandemic, there is a significant growth of e-commerce, which has contributed to the serious development of courier services and their territorial distribution.

International road freight transport also increased – from 18,751.2 thousand tons in 2019 to 30,568.9 thousand tons in 2020 and 14,894.2 mil. tkm in 2019 to 25,156.5 mil. tkm in 2020. The almost double increase in both tons of materials and goods, and the mileage, is due to the same reasons that have affected domestic road transport and due to the special requirements of the health and border services for truck drivers.

### III.

However, the impact of the economic crisis and the SARS-Cov-2 pandemic cannot be accepted as the only reason for the problems in the logistics service in the Republic of Bulgaria. The reports and surveys of the various industry bodies from business and logistics are focused on the evaluation of the logistics services in the country and are based on criteria and indicators, reflecting their subjective opinion and limited scope. These indicators do not allow the logistics services in the country to be objectively compared to those in other countries and to highlight the significant problems.

For this purpose, the "Logistics Performance Index" can be used, on the basis of which, according to an internationally recognized methodology, the "World Bank's Global Ranking of Logistics Performance Index" has been prepared [2].

The generalized score and ranking of the Logistics Performance Index reflects the perceptions of the country's logistics results based on the efficiency of the customs clearance process, the quality of trade and transport infrastructure, the relative ease of organizing international shipments at competitive prices, the quality of logistics services, the ability to monitor the routes and track consignments and the frequency with which consignments reach the consignee within the planned time.

The index varies from 1 to 5, with a higher score representing better performance. The data are from the Logistics Performance Index surveys conducted by the World Bank in partnership with academic and international institutions, private companies and individuals involved in international logistics.

The range of surveys for 2018 covers nearly 6,000 estimates for countries by about 1,000 international freight forwarders. Respondents rated eight economies on six main dimensions on a scale of 1 (worst) to 5 (best).

The economies are selected on the basis of the most important markets for export and import of the respondent's country, at random, for landlocked countries, neighbouring countries that connect them to international markets. The results for the six areas are averaged for all respondents and summarized to one result by analysis of the main components.

The Logistics Performance Index and Its Indicators is available at lpi.worldbank.org

The World Bank ranking by country is shown in Table 6. 160 countries are covered in the ranking. [2]

Comparing Bulgaria and Germany on the index indicators for the quality of logistics services shows that we lag behind on all indicators, and this is especially strong on the indicator "Infrastructure". (Fig. 1)

The lowest score for Bulgaria, related to the availability and use of available infrastructure (52nd LPI Rank, 2.76 Infrastructure score) is the same as that of Rwanda (57th LPI Rank).

The main reason for this score is due to the condition and use of port infrastructure and especially the river infrastructure. For the implementation of multimodal transport it is necessary to use this infrastructure and take into account its capabilities related to the ability to meet the standards for loading and unloading activities, the availability of quays, crane facilities and inland port transport, the availability of specialized warehouses for bulk and other loads, container terminals, temporary parking lots for waiting and loading / unloading of trucks, etc.

River ports in Bulgaria often cease to operate due to climate reasons - prolonged droughts in the last decade...
have led to a decline in the level of the Danube River and the suspension of shipping, especially on larger vessels. For a long time temperatures have not been low enough during winter time to lead to freezing of the water and the appearance of a massive and ubiquitous ice cover, which could hinder navigation. For objective reasons, river ports cover relatively lower rates for carrying out loading / unloading activities compared to seaports. A large proportion of river ports do not support 24/7 working hours, which increases the processing targets, because work is only carried out during daytime. Overcoming the delays in the handling of goods requires experience and very careful planning of all processes related to the organization of: transport process car-ship and ship-car, storage in temporary warehouses (if necessary), the organization of loading and unloading activities with external transport companies, warehousing in customs warehouses and processing of customs documents of customers, etc.

Another area in which we lag significantly behind the Federal Republic of Germany is the indicator "Quality of logistics services". Obviously, the respondents rated the quality of the provided logistics services as relatively low. This is an integral indicator reflecting the opinion that the offered services do not meet the generally accepted international quality standards. The reasons are also complex, but this is largely due to the rapid development of courier services and the entry of new companies in the industry, attracting employees with qualifications that do not meet the high requirements. To some extent, the lower quality of services is also due to the underdeveloped infrastructure, which was analysed above. The low quality is also due to the insufficient development and offering of multimodal transport by the logistics companies in the country.

Problems with the use of multimodal transport in the country are due to various reasons. The use of rail transport as part of a multimodal supply chain reduces costs, but rail infrastructure that has limited coverage, long freight times (transfer from car to railcar / platform and vice versa), small country size and highly developed road network make the use of road transport more competitive. For this reason, the main component of multimodal transport in a country is the transport of containers. Container transport, which accounts for the vast majority of international transport and trade, requires the development of a multimodal infrastructure to meet the requirements of global customers. In order to solve the problems related to the insufficient development of the transport infrastructure, it is necessary to create regional hubs, combining two or more types of transport infrastructure, multimodal transport-logistics centres, as well as the use of state-of-the-art digital technologies, which are actively being implemented by international logistics companies. Trends show that the most developed countries consider multimodal transport as extremely promising because they create favourable conditions for the accelerated implementation of the latest advances in science and information and computer technology. In these centres it is necessary to introduce the most modern logistics technologies related to the organization of warehousing and storage of goods, infrastructure for handling activities and more.

A very good example of this is the multimodal logistics centre built in Hamburg, the second largest port in Europe, which ranks first in Europe in rail container transport, first in sea freight in Northern and Eastern Europe and operates the largest railway junction in Northern Europe.

Another indicator of the World Bank’s Logistics Performance Index where Bulgaria lags behind the leader Germany is "Customs Services" – with a score of 1.94 for Bulgaria and 4.09 for Germany. As Bulgaria, as a full member of the EU, implements customs procedures that are common to the EU or are harmonized with them, the low score is due to the insufficiently expeditious work of customs administrations and customs brokers and agents. Another explanation for the insufficient development of multimodal transport is the legal problem that arises in determining the responsibility of each unit of the logistics chain in case of delay, damage and loss of cargo and the absence of a special law on multimodal and intermodal transport and generally accepted rules. Transport logistics is an essential part of the global economy and thus it could not avoid the large-scale negative consequences of the COVID-19 pandemic. International passenger transport, most of which is by air, has suffered extremely severe cuts and losses due to border closures and announced lockdowns and a number of other restrictive measures by governments (PCR tests, green certificates, etc.). This has led to the cessation of regular flights by some airlines, mainly low-cost ones, which has led to large financial losses for them and to a reduction in air and ground staff. This necessitated measures by governments to support them. The impact of the pandemic has affected the transport of goods by other participants in the logistics business mainly in reducing the demand for their services due to the general economic crisis and the reduced activity of economic entities.

IV. CONCLUSION

Governments and logistics companies need to develop effective measures to be involved in post-pandemic recovery. This recovery, and the overcoming the consequences of the pandemic, will certainly affect the implementation of innovative logistics technologies and the construction of the relevant infrastructure and improvement of the existing one. Taking into account the accumulated experience, there is an increasing need to stimulate and implement innovations in the field of digitalization and new specialised mobile applications.
### Table V

**Freight Transport by road [1]**

<table>
<thead>
<tr>
<th>Type of transport</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>For a fee</td>
<td>Total</td>
</tr>
<tr>
<td>Thousand tons</td>
<td>Mil. tkm.</td>
<td>Thousand tons</td>
</tr>
<tr>
<td>Domestic transport</td>
<td>41,979.4</td>
<td>3,242.3</td>
</tr>
<tr>
<td>International transport</td>
<td>18,002.7</td>
<td>14,894.2</td>
</tr>
<tr>
<td>Total</td>
<td>59,982.1</td>
<td>17,504.3</td>
</tr>
</tbody>
</table>

### Table VI

**World Bank rating on the logistics efficiency index**

**LPI (Logistics Performance Index) 2018-2019**

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>LPI Ranking</th>
<th>LPI Evaluation</th>
<th>Customs</th>
<th>Infrastructure</th>
<th>International shipments</th>
<th>Logistics quality and competence</th>
<th>Tracking and tracing</th>
<th>Timeliness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>2018</td>
<td>1</td>
<td>4.20</td>
<td>4.09</td>
<td>4.37</td>
<td>3.86</td>
<td>4.31</td>
<td>4.24</td>
<td>4.39</td>
</tr>
<tr>
<td>Sweden</td>
<td>2018</td>
<td>2</td>
<td>4.05</td>
<td>4.05</td>
<td>4.24</td>
<td>3.92</td>
<td>3.98</td>
<td>3.88</td>
<td>4.28</td>
</tr>
<tr>
<td>Belgium</td>
<td>2018</td>
<td>3</td>
<td>4.04</td>
<td>3.66</td>
<td>3.98</td>
<td>3.99</td>
<td>4.13</td>
<td>4.05</td>
<td>4.41</td>
</tr>
<tr>
<td>Austria</td>
<td>2018</td>
<td>4</td>
<td>4.03</td>
<td>3.71</td>
<td>4.18</td>
<td>3.88</td>
<td>4.08</td>
<td>4.09</td>
<td>4.25</td>
</tr>
<tr>
<td>Japan</td>
<td>2018</td>
<td>5</td>
<td>4.03</td>
<td>3.99</td>
<td>4.25</td>
<td>3.59</td>
<td>4.09</td>
<td>4.05</td>
<td>4.25</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>2018</td>
<td>52</td>
<td>3.03</td>
<td>2.94</td>
<td>2.76</td>
<td>3.23</td>
<td>2.88</td>
<td>3.02</td>
<td>3.31</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>2018</td>
<td>160</td>
<td>1.95</td>
<td>1.73</td>
<td>1.81</td>
<td>2.10</td>
<td>1.92</td>
<td>1.70</td>
<td>2.38</td>
</tr>
</tbody>
</table>

**Fig. 1 Comparison of Bulgaria and Germany on the indicators of the Logistics Performance Index**

**REFERENCES**


Features and Requirements in the Application of a Methodological Approach for Service Specifications in Firm Management

Ivaylo Ts. Stoyanov

Abstract – The publication discusses the features and requirements in the application of a methodological approach to specifications and service management, as an important part of the activities of companies in the tertiary economic sector. The main categories of the creation and provision of services are presented, reflecting their specifics in the interaction of the company with customers and structuring initiatives for the implementation of services. An analysis of the different categories has been made, as they influence the customers' decision to buy, their experience of the service and their retention by the company as loyal customers.

Keywords – clients, methodological approach, specifications, mapping, services.

I. INTRODUCTION

Every company that provides business services develops specifications for customers, but this is not a sufficient condition for high quality services to meet their needs. The competitiveness of the company depends on activities that require commitment, resources and opportunities for success. In order to design the service in line with the requirements of the clients and the resources of the company, the connections between its separate components are diagnosed and mapped, so that the reference points and key indicators for its management are visualized. This activity can be applied to existing services or innovative (new) ones, so that a graphical interpretation (mapping) of the service process can be made, establishing the priorities in people's work, the use of physical assets and the attitude towards customers.

II. CATEGORIES OF METHODOLOGICAL APPROACH FOR SPECIFICATIONS AND SERVICE MANAGEMENT

The companies in the service sector make different types of contact with the client (high and low), which determines the point of interaction between the company and the consumption of the service. The higher the contact with the client, the more detailed mapping of the interaction processes is required, the requirements and expectations for the quality of service are taken into account, because the main role in this process is played by the employees from the front office of the company. However, this does not mean that all processes or activities in the design of services that do not have a visible effect on the client should be neglected. In fact, this raises an important question for planning events and mapping the categories that form a methodological approach to specifications and service management, taking into account their key features and requirements in the service process. Companies should anticipate all steps in the process of creating and providing the service in two aspects: perception of quality and performance of employees, which in a high degree of customer contact are evaluated in parallel and difficult to measure the efficiency and effectiveness of the service process [4]. If there is no synchronicity of interaction between the units (departments) of the company, preliminary preparation for mapping the processes for diagnosing customer requirements and expectations for service quality, distribution of people's tasks and use of equipment, problems in the service system are possible. The client must remain satisfied with the work of all units (departments) with which he has contact points, so as to comprehensively assess the quality of service, because a loophole in the system can negatively reflect on the attitude towards the company and its image [7]. Therefore, the company's management defines the main categories of each service and visualizes them in the form of graphical interpretation to establish the basic requirements of customers and the work of people in units (departments) to achieve goals so that there is no lack of information, duplication of tasks or unusual operations. On the other hand, mapping helps to see the client's actions in his relationship with the company and to anticipate the tasks of people who often do not coordinate work with each other, which leads to errors and problems in service [3]. "bottlenecks" and to respond to perceptions of the needs for the expected service. Understanding service specifications ignores internal issues and weaknesses because it allows you to coordinate work on service delivery and synchronize resources to achieve company goals and priorities for service quality and customer satisfaction.

Each plan that is developed for specifications and service management is mapped differently with several options, looking for the optimal balance between service
quality and company goals. Whatever the approach to mapping in the specifications and management of services, specific categories are taken into account (divided into four sections), which are present in the schematic visualization of each type of service, as follows [1,5,8,9,12,15]:

Section I. Customer actions

This section identifies all the actions of the customer and analyzes his behavior in the service, so as to decipher the attitudes, expectations, requirements, priorities and emotions when buying the service. It is a complex process that requires time and effort of marketing analysts, company strategists, human resources managers and information and communication technology specialists to generate data and information on specifications that determine the direction of service management (creation and provision). As a result, three elements are formed that are important for establishing the actions of customers, namely [1,5,8,9,10,13,15,20]:

- 10074enerative process of finding and purchasing a service from the client

Before making a final purchase decision, each customer performs actions (from searching for useful information about the service to purchasing it) to make sure of the value of the purchase. For most companies, it is a real challenge to be able to anticipate his actions, which cover different steps of mental attitudes and behavioral reactions. In the context of service specifications, special maps (models) are developed, which generally show the company's imaginary idea (but with real visualization) of the customer's actions, emotional attitude to the service, the advantages and disadvantages of the company for its implementation [16]:

Each map identifies processes or symbols that help analysts work to interpret events and facts related to customers and potential opportunities to use or opt out of the service. Each map designation plays an important role in the analysis and requires an appropriate and reliable interpretation. The maps show the point of view of the client, which may arise in the process of seeking and purchasing services, but also the level to which the company can meet their requirements for quality and value, incl. rethinking the approaches and methods for interaction with consumers, which requires a change in company culture. From this position it is possible to establish not only the experience of the client, but also the work of the units (departments), especially when there is no synchronization between them or the employees do not have the necessary training to work with clients. Good service management requires the organization to focus on customer thinking and actions, as well as service specifications, rather than designing specific features that show only the vision of the organization, without considering the customer's requirements for the service.

When determining the specifications of the visualization card services, at least three requisites shall be taken into account, with the possibility of additional designations [1,5,8,9,10,13,15,17,21]:

- Identification. Each service specification map must reflect a specific process and the entity that will be involved, i.e. the type of service and the profile of the client who wants and has the opportunity to purchase it. Mapping can be performed for an actual process (which exists) in the company's service portfolio (or part of a service), but data for a new service that is expected to be designed and offered to customers can be interpreted. In the first case, data is generated by the units (departments) of the company based on customer relationships, which means a wide range of data and information extracted from the company's registers, marketing research, field research, interviews and more. In the second case, benchmarking and analysis of competing services is performed to investigate the process, identify gaps in competitors (if any) or take good practices to be adapted to the company when mapping future service (s). for customers. It is possible to combine the two approaches to achieve a greater effect on the visualization map or to eliminate inefficient processes from one map by designing another - the processes and good practices that will lead to a positive customer experience from the service. For each specification of the service, specific goals, deadlines for implementation and expected results must be determined.

- Tracking customer expectations, actions and satisfaction. This is a difficult sub-stage for defining the specifications and managing the services, where different fragments from the demand for the service to the actual purchase are analyzed. The map presents three stages of the client's overall vision for the service - his preliminary attitude (expectations), real or possible decisions (actions) and the result of the client's assessment of the service (satisfaction or dissatisfaction). Qualitative research (generated in the company's database) on the behavior of actual customers or forecasts of potential solutions (when designing new services) is then performed through simulations or scenarios [2]. It is essential to analyze the critical points of communication, expectations, experiences and reactions of consumers to the company's service.

Information is collected regularly by stakeholders on the basis of preliminary customer data or meetings are held, where departmental representatives report on their portfolio, after which the information is summarized and linked to mapping for all units. In the absence of reliable or unconfirmed data on the maps, hypotheses are handled, which must then be substantiated with real facts, and when there is a discrepancy between hypothesis and facts, the visual indications of the map are rejected and a new one is developed [6,9,15,19].

- Discovering the strengths and weaknesses of the company to implement the service. After analyzing the expectations, actions and customer satisfaction with the service, weaknesses or potential opportunities for improvement can be identified.

- Physical aspects that are an integral part of customer service

In determining the actions of customers, the physical aspects contribute better to associate the process of service in search and purchase. This raises the issue in two
dimensions - the customer's perception of consumption and specifications, so that the company can improve the convenience and functionality of the service. Although they are at the beginning of the mapping, the physical aspects are usually presented last on the map when the other categories are visualized in the design of the services. This does not make them less important than the other components, because they create the impression of the client about the work and the attitude of the company to him, which influences his decision to purchase the service. For example, using the company's website is an important element of consumption for some customers when they want to acquire information about the service and if they like to order it. The customer's first impression is the functionality and convenience of the site, because if the information is poorly structured, there are no categories or clear designations for the service, it will probably make it difficult for the customer, irritate him and may even refuse to buy. In a restaurant, if there is no suitable setting or atmosphere, if the hotel staff do not have the necessary uniform or style of work, all these circumstances would reflect the customer's assessment of the service, although its characteristics meet quality standards. Therefore, physical aspects are an integral part of the specifications and management of services that are reported by stakeholders.

- Customer service time
  This is one of the priorities of service companies, because time is a key factor in retaining customers when they are satisfied with the speed and quality of service. But the time for creating and providing services is important for the company, for the same reason when looking for shortening the service cycle and processing more customers, i.e. potential revenue from the purchase of the service and customer satisfaction from the lack of queues or long queues. In order to study the total time for the service against each card operation, the time interval (minutes, hours, days) is presented so that the company can diagnose the time required and the factors that affect the service. This comparison helps the company to determine whether the service is performed at the optimal time for the client or there is a delay. If a time problem is found, i.e. the company's response to serve the customer on time is looking for reserves to optimize the time.

Section II. Company actions visible to the client
These actions have a significant impact on the customer's behavior and consciousness to assess the quality of service through a "moment of truth", which reflects on his subsequent purchasing decisions. Companies must create appropriate conditions for customer satisfaction with the purchase in order to remain loyal customers and be satisfied with the company's attitude towards them, and employees must be motivated to fulfill their professional commitments [11].

The requirements for companies in this regard are to make the visible elements not only accessible to the customer, but also to create a positive attitude towards the service and trust in the company. In practice, these are the actions of employees from the front office of the company and their communication with customers (in the site, in the office, by phone, etc.), which must be at the required level, as well as physical objects noticed and interpreted by the user. But the point of contact between the customer and the company can be digital and also create an initial impression of processes visible to consumers, which reflects on the evaluation or their choice to purchase the service. For example, when placing an order online, the customer will be impressed by the company's response to the request or the application of the chatbot, the time for processing the order, the time for its delivery, the electronic storefront and more.

Section III. Company actions invisible to the customer
Actions that are not visible to the customer and are performed in the back office (or by front office employees without the customer noticing them) in order to support the work of the front lines. The work in the back office remains hidden from the client and there is no real view of what happens to a part of the employees' activity or the application of technology to create and provide the service. Although there is no direct contact of the client with the actions of the company to create and provide the service, these processes are important for the end result [14]. What gives greater freedom to the company is the lack of customer access to these processes, which allows to diagnose and eliminate inefficient operations without directly affecting the user's assessment of the service.

Section IV. Supporting processes
They support the work of employees in performing operations related to the design of the service. Supporting processes arise as secondary activities and affect all levels of the company so that people can perform their duties without problems. They do not usually relate directly to customers, but indirectly affect the outcome of the creation or provision of the service and are therefore part of the company's overall service quality policy [18]. No company can afford not to carry out support processes, regardless of whether they are in the competence of support staff or will outsource them.

When determining the specifications of the services, accompanying elements are taken into account, supporting the process of human interaction, dissemination of information and regulation of the tasks in the separate categories (sections) of the service plans. This is done through dividing lines and markers that fix the level of interaction and designation of key positions in the scheme for the creation and implementation of services.

III. CONCLUSION
The methodological approach to specifications and service management must take into account the specifics and requirements for its application, which will give greater clarity to service designers and the human factor for their implementation. In each fragment of the service design,
company activities are performed (visible and invisible to the client), which help stakeholders to identify individual processes and activities, based on possible alternatives for action. This means that the mapping of a service usually covers different specifications, which are reflected in the working documentation to determine the optimal ratio of available resources, the ability to design the service and ways to meet customer needs and expectations.

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Virtual Coaching Services During the COVID-19 Outbreak

Ivaylo Ts. Stoyanov

Abstract – The publication examines the virtual coaching services in the conditions of COVID-19, caused by the current state of the business environment and the entry of advanced information and communication technologies in all spheres of business and public life. Virtual coaching services have changed the conventional understanding of the coach and the client to organize and conduct coaching sessions, their role in this process and the result of their interaction. The publication focuses on some basic statistics and trends in coaching services in the context of COVID-19. An analysis of some positive and negative effects of virtual coaching services has been made, as a necessary practice in the coaching profession.

Keywords – coaching services, virtual coaching, coaching effects.

I. INTRODUCTION

Over the last two years, coaching services have undergone a transformation in the approach to their implementation, which invariably reflects not only the work and behavior of coaching professionals, but also their clients. Like most business activities in various sectors of material production and the intangible sphere, coaching services began to become virtual, and sessions between coach and client became more specific. On the one hand, this is due to new technologies and IT tools that are entering all sectors of business and the public sphere, but on the other hand, the COVID-19 pandemic not only accelerated the process but also rethought routine approaches to human relationships, social communication and business communications. This process began with the expansion of COVID-19, and in March 2020, the World Health Organization announced the virus as a pandemic, a disease dangerous to human health, which affects not only coaching services, but all professional activities in the public sphere.

II. COACHING SERVICES IN THE COVID-19 PANDEMIC

The key point in the pandemic and post-crisis COVID period is not so much whether virtual coaching is necessary, but whether it has the same effect as traditional coaching sessions. The coaching industry cannot stop functioning, even in the context of COVID-19, as it generates billions of dollars worldwide, and coaching services are a progressive profession that will continue to develop [12,13]. As a result of a large-scale study by the International Coaching Federation [13] on the impact of COVID-19 on the coaching industry in 2020, interesting patterns and trends related to the work of coaching professionals, the impact of COVID-19 on key indicators and financial indicators performance indicators, changes in services offered and customer relationships. The survey was conducted in nine languages in seven regions of the world, with the largest number of respondents in North America (3,583), Western Europe (2,140) and Latin America and the Caribbean (1,208). Regarding the income generated by coaching specialists, 49% of the respondents answered that they have decreased, and 37% of them have reduced the hours for coaching sessions, while 34% do not think that the pandemic has affected their income and professional commitment. in an unfavorable way [13]. The COVID-19 pandemic has affected the coaching industry on all continents of the world, with coaching experts saying that in 2020, three out of four coaches (74%) had reduced working hours, which also affected their income. and 12% have temporarily closed down, with the highest percentage in North America (38%) [13]. On average, a larger proportion of COVID-19 pandemic-affected coaching professionals are in the business sector and fewer outside it, with those in the business sector generating 54% of losses and outside the business sector 44%, reduced working hours for coaching experts in business it is 39% and outside the business sector it is 32%, noting that the cessation of activity is 12%, both for business and outside it [13]. When respondents were asked to rate the impact of the COVID-19 pandemic on their overall performance, 25% of coaching experts said it had an extremely negative impact, 40% said it had some impact, and only one in 10 coaches (10%) answered that the pandemic did not affect coaching at all [13]. Regarding the internal and external coaching specialists of the organization, the COVID-19 pandemic had a more negative impact on external (28%) and less on internal coaches (11%) and those who provide coaching services in both areas (11 %) [13]. Since the beginning of the COVID-19 pandemic, 51% of coaching professionals have reported a decline in clients, and their hours of coaching practice have decreased to 47%, while 57% of coaching experts report a decline in income due to outflow of clients and reduced employment. time, as a small proportion of coaches surveyed indicated that the pandemic had increased the number of clients by 21% and...
their working time by 27%, with rising incomes of only 14% [13]. Globally, the largest outflow of customers is in Latin America and the Caribbean (58%) and the least in Asia (47%), the number of hours worked is again the largest in Latin America and the Caribbean (65%) and the most the least in North America (44%), with the largest share of declining incomes since the beginning of COVID-19 observed in Latin America and the Caribbean (65%) and the least in North America (52%) [13]. Almost half of coaching practitioners (48%) have increased their coaching hours since the onset of the pandemic, ranging from 45% in Western Europe and Oceania to 54% in Latin America and the Caribbean [13].

The ICF report offers an interesting comparison in terms of offering types of services, including coaching services under COVID-19. With the smallest share of discontinued services in a pandemic situation are coaching services (3%) and consultations (3%), and the highest share of services offered falls on coaching services (91%) and counseling (48%) [13]. During the COVID-19 pandemic in 2020, there was a change in the working methods of coaching practitioners, especially in personal contact with clients, which was reduced to 80%, but on the other hand, virtual coaching services increased sharply through the use of audio-video platforms (74%), as well as other forms of communication, such as telephone use (27% increase) [13]. Interestingly, 49% of respondents said that SMS / Text / Instant Messaging is not suitable for coaching sessions, and 41% answered that e-mails, with a large proportion of respondents in different regions of the world disagree arguing that they do not have the right coaching technology, with the percentage ranging from 44% for Eastern Europe to 33% for Latin America and the Caribbean [13]. Many coaching professionals (71%) agree that COVID-19 calls for greater investment in technology in the future, ranging from 58% for Eastern Europe to 49% for North America.

A study by Allied Market Research [23] for the period 2020-2027 (regions studied are North America, Europe, Asia-Pacific and LAMEA) shows that in the context of the COVID-19 pandemic, the online coaching services market will continue to grow, and the use of digital technologies and digital platforms for remote work will become increasingly urgent. It was also noted that in the future the functionality of the technology platforms for coaching relationships will be improved and the choice of users will be unlimited.

III. EFFECTS OF THE VIRTUAL COACHING SERVICES DURING THE COVID-19 OUTBREAK

Undoubtedly, the COVID-19 pandemic has caused serious damage in all areas of business and social sphere, which also reflects on coaching services. Internationally, new trends have emerged due to teleworking, which has rethought the views of many business approaches and tools in the corporate sphere. The COVID-19 pandemic has also affected the coaching profession, where face-to-face meetings and coaching sessions are increasingly giving way to new trends in the digital business and the application of IT platforms and tools for communication from home or work [2,8,11,27]. This inevitably reflects the work and behavior of the parties in the coaching process, which adapt to the new challenges of digital business practices and requirements for digital communication in the professional sphere.

There is no unambiguous definition of virtual coaching in the specialized literature, even the concept itself is associated with different terminology - distance coaching, distance coaching, digital coaching, technology coaching (telecoaching). As a result, it can be said that virtual coaching services should be understood as interaction between two or more entities (coach-client) in an online environment, based on an appropriate platform for work, way of interaction and appropriate communication strategy, to support the personal or professional development of a needy person or group of people [1,4,5,7,18].

The role of technology stands out from this definition, along with the relationships of participants in the coaching process and the desire to achieve positive results. Of course, virtual coaching services have a different focus to provide an alternative view of a situation or problem to help people in the digital environment understand their own actions, those of others, or what is happening in the environment. Therefore, coaching services are successfully applied to senior executives, groups and teams, career advancement, life well-being and more. [4,7,9,6,26].

Virtual coaching is not a new trend in the coaching profession, but in the context of COVID-19 its application has grown significantly. This requires taking into account some preventive requirements for conducting virtual coaching services in a pandemic environment, the most important of which are [1,3,4,5,10,15,19,14]:

- Stable internet connection

The efficiency and effectiveness of virtual coaching services strongly depend on the technological connectivity of stakeholders and the quality of obtaining higher speeds, which of course depends on ISPs. In most business offices or coaching centers, where the workplaces of coaching experts are located, the Internet connection is stable and can provide very good or excellent conditions for conducting virtual coaching services. Care should be taken in coaching sessions at home, where it is necessary to ensure adequate internet connection and the choice of a provider who will maintain a stable and constant connection or will respond promptly to problems of a technological nature. It is preferable to use a fiber optic connection (FiOS) so as to provide a higher speed of the principle of light exposure to the optical network. In different situations, coaching professionals or their clients use a wireless network (Wi-Fi), but the location of the technical device, the presence of other devices in its range and the point of contact for direct interaction must be taken into account. In order to use the maximum speed of the Internet connection, a modern technical device with appropriate technical parameters is required, when relying on a Wi-Fi connection, there should be no barriers and restrictions on Internet access, etc.
• Appropriate communication in a virtual environment

In order to provide efficient and effective virtual coaching services, synchronous and asynchronous communication between stakeholders is applied. From the point of view of the specifics of the coaching process, higher priority is synchronous communication, which requires immediate connection between two or more participants who communicate verbally or non-verbally in real time, but in different environmental conditions. There are various opportunities for synchronous communication, but in coaching services it is important to choose a technology platform for coaching sessions to satisfy stakeholders. It can be said that in the conditions of COVID-19, the most suitable synchronous communication for coaching services are video conferencing and their tools, which are closest to physical face-to-face communication. In the context of digital technology, innovation and the development of digital communications, there are a variety of options to choose a platform for business meetings and sessions in an online environment. The most common and used online tools for video conferencing and interaction of participants in cyberspace are Microsoft Teams, Zoom, Google Meet, Blue Jeans, Webex, Skype and others. Each of these online video conferencing tools has advantages and disadvantages that are well explored by stakeholders before embarking on a coaching process. When choosing a technology platform, it is important to take into account requirements related to the needs of the participating countries, technical functionality and interface of the platform for coaching sessions, opportunities for communication exchange and price parameters. Some coaching platforms (such as BetterUp's "IdentifyAI") have built-in functionality to select people in need of coaching services in the company according to their level of career development, their coaching preferences and their willingness to take advantage of the coaching services offered. A specially developed algorithm then determines the type of coach and tools needed for the employee. In addition to video conferencing, a telephone conversation can be used in the coaching process or its individual stages, which allows quick feedback between the parties, but loses the effect of visual contact, albeit virtual. In addition to synchronous communication, asynchronous communication is used, but it has a secondary effect and is not preferable in coaching services, except in cases where it is necessary to inform participants, make clarifying findings or ask questions for further discussion in online platform. Asynchronous communication between the participants in the coaching services is carried out through e-mail, text messages, discussion forums, etc., where the sending and receiving of information between the parties differs over time. All participants should be able to use (or be trained) the functionality of online video conferencing tools, ensure the protection of personal data and information sharing, find appropriate time for coaching sessions and conditions for everyone to discover their potential.

• Attitude and behavior of the coach and the client

Virtual coaching services, especially in the context of COVID-19, cannot be implemented if they are not in line with the understandings, attitudes and perceptions of stakeholders. This is a two-way process - for the coach and the people who need coaching services. If stakeholders do not have the necessary vision and desire to participate in coaching sessions, then they are doomed to failure, will not have the desired effect and should not implement. On the other hand, lack of concentration or ineffective communication in the online environment can impair coaching services, so it is important to specify the type and format of coaching sessions. The problem for most of the participants is the lack of choice (or limited) in COVID-19, which is a prerequisite for refusal or it will affect the work and image of coaching experts and will reflect the quality of coaching services for clients. In order for coaching to be at the required level, participants adapt to conducting it in a pandemic environment, which means diagnosing the situation, taking into account individual needs and applying appropriate coaching tools. It should not be forgotten that people have their own personal characteristics of character and behavior, as well as different competencies that should be taken into account when organizing virtual coaching sessions. For example, participants with a closed type of behavior may prefer virtual coaching services, while the dynamic type of people prefer to meet other people, exchange ideas, actively communicate and experiment. Other participants cannot handle digital technologies and prefer the conventional approach, and vice versa.

• Environment

Unlike conventional coaching services, where sessions are held in appropriate places (in the office, in nature, in a real practical setting, etc.), virtual coaching services are conducted from any place where there is a technical device and connection. Under COVID-19, this creates a number of advantages over the traditional approach, but under certain circumstances. One of the important problems that arise in online communication is the lack of concentration or terrible factors that hinder the efficiency and effectiveness of coaching services. Therefore, in virtual coaching services, it is important to provide a suitable place where people can be calm and focused on what they are doing or get the support they need.

• Qualified coach

A basic requirement for any type and form of coaching relationship is that the coach be certified and have professional experience in the coaching profession [4]. In virtual coaching and COVID-19, this is even more true because the skills to work in a virtual environment (technical, communication related to the profession, etc.) are crucial for achieving positive end results. On the one hand, a guarantee for a certified coach is the acquisition of certified coaching competencies by the International Coaching Federation (ICF), but on the other hand, working in a virtual environment requires the coach to have the ability to psychologically influence participants, inspire, provoke attention, provides feedback, asks the right goals and questions to achieve the desired results.
The increased use of virtual coaching services in the context of COVID-19 has allowed coaching practitioners and clients to identify the benefits and risks of their relationships in an online environment, some of which are as follows:

Main benefits of virtual coaching services [1,4,6,9,19,20,21,22,25]:

- Geographic boundaries and distance are removed

  Digital technologies and audio-video platforms for communication and information sharing help people when they need to be in different places without having to physically move from one geographical location to another. This allows participants to save on travel and accommodation costs, to maintain office buildings and supplies, to organize seminars and more. On the other hand, in virtual coaching services, clients are not limited to choosing coaching specialists in their area or geographical area, they can hire appropriate experts around the world. This is a significant advantage, because we must not forget that a large percentage of the success of coaching services is due to choosing the right coach who has certified competencies and skills to support the personal and professional development of their clients. In virtual coaching services, some of the basic skills of the coach stand out, i.e. the ability to listen and immediately provide feedback to the client, which is an important part of success in achieving coaching goals.

- Opportunity for more people to participate and personalization in coaching sessions

  When digital technologies and audio-video platforms allow an unlimited number of participants in coaching sessions, taking into account their appropriateness, the coach's help can reach a large number of clients. This is an important moment for the work of the coach, who in a short time can do a series of coaching sessions with different clients without leaving the office or home, which saves time and increases income by facilitating the process of planning and administering coaching services. Having more people in coaching service groups (especially from different nationalities) leads to a variety of perspectives, new and creative ideas, opportunities to experiment with strategies and methods of practical coaching relationships. In the conditions of COVID-19, where face-to-face physical contact endangers people's health, this is a great opportunity for the coaching profession from the coach's point of view and provide personal and professional assistance to the client. Clients can choose from a variety of options to personalize their needs and interests so that coaching programs and sessions can be tailored to their specific requirements and needs.

- Practicality and flexibility of coaching services

  One of the advantages of virtual coaching services is the practicality and flexibility of individual initiatives. On the one hand, these are specific priorities and goals for coaching services, but on the other hand, working in an online environment develops additional competencies that help the coach and the client to adapt to the requirements of digital technologies. Knowledge and skills for using modern technological platforms, for working in an online environment and achieving desired results are generated. Virtual coaching services in an organizational environment engage many more people who can get involved online than if they need to gather for meetings or specially organized coaching seminars. It can be said that virtual coaching is more profitable for companies than organizing events in a physical environment, and employees are more appreciative of the convenience of virtual coaching sessions.

Main risks in virtual coaching services [3,5,6,10,17]:

- Internet connection failure or lack thereof

  One of the possible disadvantages of virtual coaching services is when there is a problem with the Internet connection or at certain times there is none. Of course, the likelihood of a failure of the Internet connection from the provider or in the room is negligible or coaching sessions are held from a place where there is none, but can cause inconvenience to stakeholders. Sometimes important coaching sessions or conversations of the participants do not take place due to technical reasons, which can subsequently divert the focus of the conversation, omit significant clarifications, postpone speeches and so the break time does not lead to expected results.

- Lack of digital competencies and problems with understanding the work platform

  Another disadvantage that arises in virtual coaching services is when participants (especially the coach) do not have the necessary skills to work in a digital environment, which can cause problems of various kinds - people get nervous, affect their alertness, focus more technology than coaching initiatives, to lose interest, etc. Any activity that violates the comfort zone of the participants to adapt to the virtual coaching services can be a potential obstacle to achieving the desired results.

- Lack of commitment and concentration

  The social element is especially important in virtual coaching services because it can reflect on the emotional state of the participants when they lack physical face-to-face contact. The role of the coach is to make this connection realistic so that the lack of physical closeness between the participants is not felt. In order to be engaged and involved in virtual coaching services, participants need to be supported, attracted and intrigued by current and future initiatives. One more fact should not be forgotten - "working behind the monitor" is a prerequisite for lack of concentration and weakening of attention, because customers can do something else (reply to e-mail, write a message, talk, etc.). n.), while virtual coaching sessions are held on the platform.

III. CONCLUSION

Today, the corporate environment has changed, a large percentage of business meetings or coaching sessions are part of the virtual space, which is becoming common practice in everyday life and business life. In the context of the COVID pandemic, this has become a routine procedure because people find it difficult to move from one place to another and have to comply with various
restrictions and prohibitions to protect themselves and the lives of their colleagues, partners and clients. Undoubtedly, the COVID-19 pandemic, and thus the application of digital technologies in business, have created a number of facilities for faster communication and various social and economic initiatives, reduced the cost of maintaining offices, shortened the time for organizing and holding meetings, even release of human resources. However, controversial issues remain about the nature of human communication, social contact and the benefits of conventional business meetings in the context of globalization and social development [24].

The future of coaching services is promising and seems to have high potential, not only because of COVID-19, but also because of the rapid pace of development of digital technologies and their penetration into all areas of business and public life, and coaching services are no exception. The modern corporate world is constantly digitalized, various approaches, models and solutions are applied, which require digital technologies and forms of virtual cooperation. Virtual coaching will also change, modify and adapt coaching tools to work in an online environment, audio-video platforms will optimize their functionality, which will lead to analysis and synthesis of data in real time, will report on the progress of coaching initiatives and options for improving personal content.

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Application of 360 Degree Feedback in Service Projects

Gergana Dimcheva¹

Abstract – The purpose of this article is based on a literature review to derive the features of 360-degree feedback in terms of different opinions of authors. To emphasize its importance when assessing a manager’s project for services and to make a suggestion for a methodological instrumentarium for grading of manager’s skills of managing the project in the field of services.

Keywords – 360-degree feedback, project management, services.

I. INTRODUCTION

The dynamic environment in which modern organizations operate requires changes in all aspects, including project management. Every change that occurs is realized with the help of a project approach. Project management is much more than creating schedules and budgets. It involves the application of a wide range of technical and behavioral skills that need to be practiced to build knowledge and experience. The role of the project manager is very important. It must be constantly evolving and improving in order to meet the growing demands of all stakeholders.

Project management is a dynamic process of leading, coordinating, planning, and controlling a diverse and complex set of processes and people in pursuit of project objectives. [1]. In modern professional project management, the term "project" is defined through the process of implementing a set of targeted actions to create a new, unique product (good or service) within an established budget, time, and quality [2]. These tasks require the project manager to have both managerial and leadership skills, skills to interact with all project stakeholders, and the ability to make decisions. The project manager must be able to work with many different types of people, to use the diversity of his project team. According to the authors [3], human skills have a greater impact on project management practices than technical skills [3,4].

One of the factors that lead to project failure is the appointment of the wrong project manager.

Authors [5] argue that although managerial competencies are sometimes significant, emotional competencies always make a significant contribution to project success.

A successful project manager must simultaneously manage the four main elements of the project: resources, time, budget, and scope. All these elements are interconnected, they must be managed together and effectively. The resource that needs to be used effectively and that contributes the most are the people involved in the project [6,7]. In turn, proper project team management is one of the main requirements for project managers.

In fact, what does a successful project manager mean? He is not just a leader who delegates rights, assigns roles and responsibilities, assigns tasks, makes decisions. The project manager must also resolve conflict situations, be able to properly manage project communications, effectively manage the project team, be able to interact with all stakeholders in the project.

The project manager builds and maintains relationships with various project stakeholders during all phases of the project cycle. Based on the evaluation of the project manager by the stakeholders, a combined and balanced evaluation is obtained. The analysis of the results provides guidelines on what the project manager needs to develop, improve, both professionally and in terms of personal performance. A useful tool for this is 360° feedback.

The purpose of this article is based on a literature review to derive the features of 360-degree feedback. To emphasize its importance when assessing a manager’s project for services and to make a suggestion for a methodological instrumentarium for grading of manager’s skills of managing the project in the field of services.

II. LITERATURE REVIEW FOR 360-DEGREE FEEDBACK

The competitive environment in which modern organizations operate requires them to be able to maintain their resilience. To keep an organization competitive, flexible and adaptable to the rapidly changing world is mostly due to its employees [8].

360-degree feedback is very important for organizations. It is carried out mainly for two purposes: for evaluation and for employee development. More and more organizations are applying this type of assessment and are seeking to understand from the results how it can bring

¹ Assist. Prof. Gergana Dimcheva, PhD is with the University of Telecommunications and Post, Sofia, 1 Acad. St. Mladenov Str, Sofia 1700, Bulgaria. E-mail: g.dimcheva@utp.bg.
more value to the organization.[8] The 360-degree feedback assessment is also a useful tool in project management.

There can be several criteria for how successful a project is. The project was implemented on time, within the budget and scope, all requirements are met. On the other hand, it fails to provide the expected benefits, negatively affects project activities or overloads the workforce. The question arises in this case, is the project successful? The results of the 360-degree feedback assessment help and answer this question.

There are different views in the literature on 360-degree feedback [8].

According to [8,9], 360-degree feedback helps improve management style, improve communication, better teamwork, a better understanding of strengths and weaknesses, and recognize the value of good relationship skills. When using 360-degree feedback, rated employees may not feel comfortable, but this is part of the change process.

According to [8,10], 360-degree feedback improves performance. It is possible to achieve better performance, because this assessment provides strong motivation, improves the quality of information, increases staff knowledge, supports lifelong learning.

Another author [11,8] came to an interesting conclusion, according to which the information resulting from the 360-degree feedback is intended to be used in the process of employee evaluation, and not for development.

For an organization, the main competitive advantage it has is its "People". 360-degree summary reports help the organization innovate in the field of human resources related to customer service. This leads to increased sales. 360-degree feedback is a useful tool for designing and training employees, improving their skills. [12] Helps people for personal development and to know their own capabilities, abilities and to identify the necessary areas for development. [8,13]. This assessment should be in line with the strategic goal of the organization. [14] It is an effective method for evaluating the effectiveness of a person. Feedback helps to eliminate misconceptions or misperceptions [15]

III. BENEFITS OF APPLYING 360-DEGREE FEEDBACK IN PROJECT MANAGEMENT

Trends in project management in the field of services are influenced by both general trends in project management and trends in the field. In a highly dynamic information society, many organizations work differently than they did 10 years ago, for example, including in project management. [16, 17, 18, 19].

The skills of project managers in the field of services are summarized in four main areas [7,20,21]:
- technical skills - knowledge of the technologies on which the project is based;
- leadership skills - skills that are the basis of the project manager's behavior and influence its implementation;
- managerial skills - the ability of the project manager to be able to delegate rights, responsibilities, allocate resources, develop plans;
- administrative skills - a proper understanding of the company's processes, the formal and informal structure of the organization, the use of different methods in planning, implementation, and completion of the project.

Whether the project manager has these skills needs to be assessed.

What are the benefits of applying 360-degree feedback in project management? [Adapted from 22, 23,24]

- Benefits for the assessed person (project manager, project team member) - the application of this type of assessment in project management gives the person a clear idea of how he evaluates himself and how others see him. Strengths and weaknesses stand out, areas in which the person needs to improve and develop stand out. [23] Self-evaluation adds another perspective on performance and behavior. Because 360-degree evaluation feedback provides information from a variety of perspectives, feedback provides a more complete picture of an individual's performance and skills. Managers are able to see how their behavior affects others and how others perceive their abilities. [22]

- Benefits for the project team - gives the opportunity to see the strengths and weaknesses of the project team, including communication, relationships, tasks. Developing weaknesses will make the project team more effective in project implementation;

- Benefits for the organization - the results of 360-degree feedback lead to increased overall efficiency and productivity, both the project team and the organization as a whole. Eliminating the "weaknesses" identified as a result of this assessment also leads to an improvement in the employee development process. 360-degree ratings can be used to strengthen organizational values and vision. In this capacity, 360-degree feedback can confirm the value of specific abilities, behaviors, or actions in relation to common organizational values. [22,25,26].

IV. ASSESSMENT OF MANAGEMENT COMPETENCIES OF THE PROJECT MANAGER IN THE SERVICES

This publication presents the questions for assessing the managerial skills of a project manager.

Grades from 1 to 5 are given to the stated statements. The allegations are designed to assess the behavior of the
project manager during project implementation. The methodology was prepared in the author's own opinion based on [8,9,10,11,13,14,15,22,23,24]

1. Planning and organizing
- Correctly organization of resources so that the project is completed on time.
- Correctly define the operational and tactical objectives of the project so that they correspond to the strategic goal of the project.
- Prioritize joint tasks, taking into account the time of other stakeholders in the project.
- Organizes the work of the project team so that it is implemented in the most efficient way.
- Organizes the introduction of new members in the project team (if necessary) in the work tasks with the required quality and for a minimum period of time.

2. Assignment and control
- Seeks feedback from project stakeholders on the work of your team members.
- Monitors the degree of implementation of project tasks.
- Distributes the tasks of the project team members according to their level of competence.
- Sets measurable and realistic goals for implementation.
- Enables project team members to make their own decisions.

3. Communication and feedback
- Seek feedback on your work.
- Corrects his behavior according to the feedback he receives.
- It is expressed clearly and in understandable language.
- Provides timely information to all project stakeholders.
- Gives reasoned feedback.

4. Decision making
- Makes informed decisions.
- Makes timely decisions.
- Takes responsibility for the decisions made.
- The decisions it implements are in line with the requirements of the project stakeholders.
- The decisions taken correspond to the set goals of the project.

5. Employment relationships
- Maintains good working relationships.
- Encourages the people in the project team for transparency, coordination, flexibility, to share information about the progress of the project.
- Creates conditions for good teamwork.
- He sets an example with his behavior to others.
- Monitors the effective interaction of his team with other units in the organization and project stakeholders.

6. Management by personal example.
- Keeps calm in tense situations.
- Takes the initiative to solve problems.
- He adapts his behavior to the situation.
- Manages conflicts appropriately.
- Adheres to corporate procedures and processes.

The estimates are presented in the following table.

**Table I**
types of assessments of individual indicators

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>He / She</td>
<td>NEVER demonstrates specific behavior</td>
<td>HARDLY EVER demonstrates specific behavior</td>
<td>SOMETIMES demonstrates specific behavior / only in certain situation</td>
<td>FREQUENTLY demonstrates specific behavior / in most situations</td>
<td>VERY OFTEN demonstrates specific behavior</td>
</tr>
</tbody>
</table>

**Table II**
360-degree feedback results

<table>
<thead>
<tr>
<th>Rating scale</th>
<th>Evaluation</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strengths</td>
<td>Weaknesses</td>
</tr>
<tr>
<td>5.00 - 5.50</td>
<td>Very high</td>
<td></td>
</tr>
<tr>
<td>4.00 - 4.50</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>3.50 - 4.00</td>
<td>Average</td>
<td></td>
</tr>
<tr>
<td>3.00 - 3.50</td>
<td>Medium low</td>
<td></td>
</tr>
<tr>
<td>2.50 - 3.00</td>
<td>Low</td>
<td></td>
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</tbody>
</table>

V. CONCLUSION

The application of 360-degree feedback is a useful tool in project management, which needs to be done after the completion of the project. Based on the results obtained, the weaknesses in the implementation of the project are identified, both for the team members and the project manager.

In the analysis, it is necessary to make recommendations for improving the project team, because one of the most important factors for the success of the project is the human.

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Influence of Corporate Social Responsibility on Customer Satisfaction in the Services

Gergana Dimcheva¹

Abstract – The article highlights the main points of how corporate social responsibility can affect customer satisfaction. Some aspects of the impact of corporate social responsibility on the satisfaction of business users with telecommunication services are presented.

Keywords – corporate social responsibility, customer satisfaction, telecommunication services.

I. INTRODUCTION

The processes of integration and globalization enhance the importance of communication in national and international terms, both for private and business purposes. In this regard, and in terms of growing consumer requirements, competition between operators offering telecommunications services is gradually increasing, which increases their interest in issues related to social responsibility, ethics in service, satisfaction, and more. Although telecommunications organizations are mostly focused on different ways of generating revenue, they pay no less attention to their social commitment and business ethics to different segments of society, which in turn affects customer satisfaction.

The aim of the present study is based on a literature review to derive some aspects of the impact of corporate social responsibility on the satisfaction of business users of telecommunications services.

II. SOME THEORETICAL ASPECTS ASSOCIATED WITH THE CORPORATE SOCIAL RESPONSIBILITY

Corporate Social Responsibility (CSR) has been studied for decades and is constantly evolving in terms of the way in which it relates to other organizational goals. In the 1960s, CSR was introduced mainly as an ethical and social obligation of business and corporate control of external effects [1]

In modern definitions, CSR is gaining strategic importance and gradually has become a good strategic tool. It is also important to note that the costs of various CSR initiatives should be properly considered as investments, as some of the most successful corporations are also among the most socially responsible. Maximization of profit and CSR will become increasingly indivisible, and socially responsible activities must achieve a sustainable competitive advantage [2,3,4,5, 6].

According to the World Bank, "corporate social responsibility is a commitment of the business to contribute to sustainable economic development and to ensure a connection with employees, their families, local authorities and society in general, aiming at the improvement of the quality of life that is acceptable to both business and development."[7]

The purpose of the pyramid is to show that the corporate social responsibility of the organization consists of various components, as part of a whole. Despite the fact that the components are treated as separate concepts, they are not mutually exclusive and are not intended to compare the economic responsibilities of the company with its other responsibilities. At the same time, considering the individual components helps the manager to notice that the different types of obligations of the organization are in constant interaction with each other, even putting pressure on each other. For example, this can be seen as a conflict between the company's concern for profits versus its "concern for society [8].

It can be summarized that CSR includes the simultaneous fulfillment of the economic, legal, ethical and philanthropic responsibilities of the organization. In other words, from a managerial point of view, the company must strive to make a profit, comply with the law, be ethical and be a good corporate citizen.

The issues in the field of social responsibility are associated with the actions and activities of the organizations themselves in terms of seeking favorable results for them or stakeholders, society, or the environment.

Although the research question has shifted from "whether" to "how" CSR creates value, there is no conceptual or theoretical clarity on how and why CSR can bring financial benefits, but if done properly, it leads to reduction of costs, increase of revenue and increase of company's profit.

¹ Assist. Prof. Gergana Dimcheva, PhD is with the University of Telecommunications and Post, Sofia, 1 Acad. St. Mladenov Str, Sofia 1700, Bulgaria. E-mail: g.dimcheva@utp.bg.
III. CORPORATE SOCIAL RESPONSIBILITY AND CUSTOMER SATISFACTION

Satisfaction of service users is the sum of satisfaction with individual elements of the service as a product and of all services that form the service [9,10].

Corporate social responsibility is one of the important factors for increasing consumer satisfaction.

Sometimes organizations face difficulties in initiating CSR activities, which in turn leads to low levels of customer satisfaction and reduced productivity. Therefore, they need to focus on different strategies for overcoming customer satisfaction problems through CSR activities [9].

The initiatives related to the corporate social responsibility of the organization are different in nature, which to one degree or another affect customer satisfaction.

How Corporate Social Responsibility can affect customer satisfaction? [10, 11, 12, 13]

First of all, the company's customers may be potentially different stakeholders who are interested not only in the economic value of consumption but also in the overall state (including the social performance) of the company. In general, customers are likely to be more satisfied if service/product providers are socially responsible.

Secondly, CSR can increase perceived value, which in turn increases customer satisfaction. The perceived value can take both economic and non-economic forms. In order to maintain good relationships with customers, organizations can add additional benefits/useful services (from the "Customer Care" direction), such as self-improvement of users, their involvement in various initiatives of the organization, etc.

In third place, CSR can be a main determining factor of the perceived attractiveness and identity of the brand, which in turn affects customer satisfaction and trust in the brand.

According to Freeman (1984), "CSR activities can improve the brand image for customers, employees and other stakeholders, which in turn leads to increased customer satisfaction." Similarly, the author states that "effective corporate social performance leads to a good corporate image and ultimately improves the overall performance of the company."[14]

As some authors say, satisfaction is an overall assessment of performance based on all previous experiences with the organization. There are several separate "objects" for which the customers will make a "judgment" in connection with their satisfaction. [15]
This figure is a generalized model based on various studies in the literature on the impact of CSR on customer satisfaction. For more details [16,17,18]

According to the authors, overall customer satisfaction is related to the company, the relationships within it, its reputation, or even its CSR policy. Satisfied customers may be willing to pay even higher prices, which would lead to the achievement of higher levels of cash flow, which in turn increases the market value of companies and the organization's revenue.

CSR has four main aspects, and their performance and impact on customer satisfaction is as follows: [19,20,21,22,23]

- **Economic aspect of CSR** - studies have shown the positive impact of some economic determinants of CSR on customer satisfaction. For example, fair price/fair pay, significant impact of the product/service quality, waiting time, cost-effectiveness, timely response, and customer service. On the other hand, several empirical studies do not indicate a significant impact of the economic determinants of CSR on customer satisfaction.

- **Political aspect of CSR** – the compliance with legal provisions by organizations, protection of customer confidentiality, observance of the law related to customer protection, and privacy have a positive impact on customer satisfaction. However, several studies have shown the opposite effect.

- **Ethical aspect of CSR** - most studies show that the company's ethical practices improve customer retention and satisfaction. By generating profit from its activities, each organization has a responsibility to perform its business in an ethically responsible way so that society benefits from that, which in turn becomes a competitive advantage, allowing the company to create a positive image in society and gain bigger profits.

- **Charitable aspect of CSR** - organizations that carry out various charitable activities are often perceived as socially responsible and are preferred if they meet the expectations of society and the requirements of customers. All this leads to increased customer satisfaction, which in turn results in increased revenue for the organization, retention of customers, and keeping them loyal.

IV. CORPORATE SOCIAL RESPONSIBILITY AND CUSTOMER SATISFACTION IN THE FIELD OF TELECOMMUNICATIONS SERVICES

The processes of integration and globalization strengthen the importance of communication at the national and international levels for the achievement of both private and business objectives. In this regard, and in terms of growing customer requirements, competition between operators offering telecommunications services is gradually increasing, which provokes their interest in issues related to social responsibility, ethics in service, satisfaction, and more.

Although telecommunications organizations are mostly focused on different ways of generating revenue, they pay significant attention to their social commitment and business ethics to different segments of society.

Factors influencing the satisfaction of business customers of telecommunications services [24,25,26]

Factors can be included into the following groups:

- **Related to the quality of the service** - type of telecommunication service used; reliability of the service; trust-worthiness; availability of the service; connection quality; interruption of the service; security; network quality (coverage); technological time for the provision of services; additional services; troubleshooting time; a number of interruptions (damages); improvement of service quality.

- **Related to the quality of customer service** - trust; accuracy, actuality, adequacy; reliability of information according to the type of business clients; technical skills of the team involved in maintaining the service; management of customer relations; quality of the information provided; quality of the customer service personnel, including the performance of personal service; availability of the

1 These factors have been identified and the author makes his own interpretation based on studies of the scientific literature, as well as an Internet study of 109 European telecommunications operators and his own studies in Bulgarian telecommunications companies.
service; speed of information provision;
✓ **Price factors** - price structure of the subscription plans; pricing strategy; flexibility of subscription plans; transparent pricing policy; appropriate tariff plans; flexible prices; competitive prices; methods of payment for the service;
✓ **Factors related to the organization** – an image of the company; attitude of the personnel; individual solutions; established operator/market image; continuous renewal of the portfolio of services; marketing strategies used (for example - advertising, stimulation of sales);
✓ **Factors according to the stages of provision of telecommunication services:**
  - In the "Pre-sale of telecommunication services" stage - quality of the provided information and quality of service;
  - In the "Provision and operation of telecommunications services" stage - Technological time for the provision of services; Reliability of telecommunication services; Availability of telecommunication services; Time to troubleshoot problems; Transparent pricing policy; Quality of the customer service personnel;
  - In the "After-sales of telecommunication services" stage - quality of the provided information and quality of service.

By their very nature, organizations that provide services are obliged to provide excellent quality of service in order to thrive in increasingly competitive local and global markets, as there is no tangible product that can be compared in any other way in terms of quality. The perceptions and expectations of customers regarding the quality of service are increasingly used to predict the profitability of organizations and prospects for improving market share.

Unlike individual/private users of telecommunications services, business customers have different needs, which require a different approach to their service. For the acknowledgment, use the unnumbered section layout.

**V. CONCLUSION**

The ability to provide a high degree of satisfaction to business customers is crucial for operators in the telecommunications market. It is essential to identify the factors of satisfaction from the point of view of the business user and then to evaluate the company’s achievements in dealing with each of these factors.

The highly competitive environment forces participants in the telecommunications market to rely on service demand predictions to justify the significant investment needed to provide and guarantee quality services at the right time to their customers. On the other hand, a high level of competition forces the market not only to offer a greater variety of telecommunications services to both end-users and business subscribers but also to look for other ways to differentiate themselves from other market participants.


Methodical Approach to a Survey of the Corporate Social Responsibility of Telecommunication Companies

Gergana Dimcheva

Abstract – The interest in corporate social responsibility is constantly growing by business organizations. The purpose of this publication is to propose a methodological approach for measuring CSR in telecommunications companies. The main stakeholders - users and employees - have been selected. The idea is to see the effect of social initiatives in a telecommunications company, from the point of view of business users and employees.

Keywords – corporate social responsibility (CSR), telecommunications, employee, business users.

I. INTRODUCTION

Recently, trends in corporate social responsibility have been a concern of the organization's management about the role of business in supporting and improving social order. [1]. Many authors believe that CSR is a multidimensional system that includes not only economic but also non-economic issues, such as relationships with the community, employees, and other stakeholders.[2]

Studies [3] have shown the effects of CSR on organizational efficiency and examined the relationship between:

✓ CSR and customer satisfaction;
✓ CSR and job seekers;
✓ CSR and organizational attractiveness. [3,4]

The results of the study provide guidance to companies on how to better adjust their CSR strategies to improve customer satisfaction and organizational attractiveness. [3,4]

The CSR strategy of each organization should focus on such actions that are targeted to the various stakeholders in the right way. For example, personal growth of employees, procedures for processing customer complaints, compliance with ethical and legal responsibilities and work for a better environment and community, recognition of customer opinion [5].

Much of the research done in the literature largely ignores the impact of CSR on individual aspects of customer satisfaction. [6]

According to authors, the overall customer satisfaction

is related to the company, its relationships, its reputation and its CSR policy. [7]. Satisfied customers are willing to pay higher prices, which leads to higher levels of cash flow [8,9,10], increases the market value of the company [11] and the organization's revenue.

Reasons to increase customer satisfaction: The reasons given have been adapted and supplemented by [12,13,14,15,16,17]

- Good performance of social initiatives leads to a higher evaluation of organizations and better consumer attitude;
- CSR is a demonstration of fairness and can increase customer satisfaction through ethical customer service, employee training, and service improvement;
- CSR affects corporate reputation, which in turn affects customer satisfaction;
- Good CSR accountability and transparency improve customer assessment and attitude towards the company;
- Customers receive higher satisfaction from a product or service from a socially responsible company.

When developing a CSR strategy, it is important to note that it must be designed so that the results of the organization's initiatives in this area are "visible". When customers make purchasing decisions, they use information not only from various marketing channels but also from all the organization's initiatives and behaviors with its stakeholders.

The purpose of this publication is to propose a methodological approach for measuring CSR in telecommunications companies. The main stakeholders - users and employees - have been selected. The idea is to see the effect of social initiatives in a telecommunications company, from the point of view of business users and employees.

II. METHODOLOGICAL APPROACH TO A SURVEY OF CORPORATE SOCIAL INITIATIVES OF TELECOMMUNICATION COMPANIES

This methodological approach shows a different view on the study of the initiatives of telecommunications companies in the field of CSR. In developing it, the author

1 Assist. Prof. Gergana Dimcheva, PhD is with the University of Telecommunications and Post, Sofia, 1 Acad. St. Mladenov Str, Sofia 1700, Bulgaria. E-mail: g.dimcheva@utp.bg.
has based on various studies, both in the scientific literature and on the basis of conducting own ones for different purposes. The author does not claim to be completely exhaustiveness, on the contrary, this model is conceptual and subject to improvement in the future.

There are different approaches to measuring the effectiveness of CSR: corporate reputation indices, analysis of the content of annual reports / publications, measurements of perceptions based on surveys and indicators of single and / or multiple problems.[18,19,20]

Due to the different dimensions of corporate social responsibility, various scientists, individual institutions and large international research teams are developing systems of rules and standards aimed at determining its content and the criteria for its evaluation. The author divides them into five groups, according to the main goals that are pursued [21]:

**First group** - international initiatives to promote corporate social responsibility (contracts, partner networks, forums).

**Second group** - international standards for corporate social responsibility.

**Third group** - international competitions for socially responsible business.

**Fourth group** - rating agencies and specialized stock exchange indices for assessing social responsibility.

**Fifth group** - initiatives for reporting on social responsibility and sustainability and social audit organizations.[21]

After establishing similarity in measuring CSR (criteria, methodologies, standards) in telecommunications organizations with those in other fields of activity, the author's aim is to present social initiatives from another point of view.

For this purpose, methodological tools with the following stages are offered (Fig.)

**Fig. 1. Methodological approach for research of corporate social initiatives of telecommunication companies**

**Fig. 2. Social initiatives of the Bulgarian telecommunication operators in the field "Customer care"**

Among Bulgarian telecommunications operators, the most preferred method for presenting CSR initiatives are Annual Reports.

The telecommunication companies in Bulgaria prepare those with similar names - Integrated Annual Report, Sustainable Development Report (Vivacom), Corporate Responsibility Report (Telenor). Each telecommunications operator summarizes the information to varying degrees of presentation and detail.

Another way to explore the initiatives is to study the websites of telecommunications operators. All have a section "Corporate Social Responsibility" / "Social Responsibility" and published social initiatives in news and press releases. In general, Bulgarian telecoms integrate the values of CSR in their activities [22].

**A. Evaluation of CSR in the field of "Customer Care" from a consumer perspective in telecommunications**

This section documents the perception and assessment of business users of telecommunications services regarding the practices of CSR operators.

The defined directions and sub-directions in the proposed methodological tool are formulated by the author of the present study based on previous studies of business users of telecommunications services.

Due to the limited scope of the content, CSR assessment indicators from a consumer point of view will not be presented in tabular form.

The indicators are a set of statements about the initiatives of telecommunications operators from the consumer's point of view, to which the respondents have to say to what extent they agree or disagree. The Likert scale is used. Usually, the size of the answers is 5 or 7 degrees. The current methodology uses a 7-point scale - from 1 (completely disagree) to 7 (completely agree). The Likert scale is easier for respondents to understand and respond to.

After each direction, the maximum number of points is defined.
1) Full information about the services, incl.
✓ informing the client about the possible options for technical solutions/services according to his requirements;
✓ informing the client about the way of elimination of established technical discrepancies/damages of the telecommunications services;
✓ the telecommunication service has the agreed technical parameters - serviceability of the service.
Максимален брой точки – 21 т.

2) Pricing and charging, incl.
✓ informing the client about the necessary monthly expenses at the consumption of telecommunication services;
✓ clearly formulated pricing principles for the consumed telecommunication services;
✓ accuracy in charging for the consumed telecommunication services.
Максимален брой точки – 21 п.

3) Protection of health and safety when consuming products/services, incl.
✓ safety in the use of the services (for the persons using the services and the available equipment);
✓ telecommunication services are easily accessible (do not require specific settings immediately before use by the customer);
✓ the telecommunications operator provides information on the effects of electromagnetic radiation / mobile networks on human health.
Максимален брой точки – 21 п.

4) Customer feedback, incl.
✓ in the event of a technical problem, the telecommunications operator shall eliminate it according to the agreed deadlines;
✓ in case of complaints made by the client, the telecommunication representative processes them in a timely and adequate manner;
✓ the telecommunications operator has different forms of customer feedback.
Максимален брой точки – 21 п.

5) Ethics in customer service, incl.
✓ timely informing the client about the decisions of the telecommunication organization that are directly related to him;
✓ individual approach to service;
✓ demonstration a commitment to continuous improvement of the services provided;
✓ enabling the client to participate (involve the client) in the selection and definition of services;
✓ polite and friendly attitude with the client;
✓ confidentiality of personal information about the client.
Максимален брой точки – 42 п.

6) General CSR issues
✓ the telecommunications operator carries out various charitable initiatives;
✓ the telecommunications operator shall announce public CSR initiatives;
✓ the telecommunications operator is certified with standards in the field of CSR;
✓ the telecommunications operator participates in partnerships with other organizations / independently in initiatives related to environmental protection;
In this direction, the surveyed business users answered with 0 points - No and 1 point - Yes.
The idea of assessing CSR in the last direction of this methodology is borrowed from [14], where a model is proposed for assessing the social responsibility of business organizations in all areas of CSR.
Максимален брой точки в посочената посока – 4 п.

The total number of points for evaluation of the social initiatives of the Bulgarian telecommunication operators in the direction "Customer Care" is 130 points. They are obtained by summing the points obtained from the considered sub-directions. The formula is used:

$$BUTS_{CSR} = \frac{\sum_{i=0}^{n} CC}{130}$$

where

- $BUTS_{CSR}$ – business user of telecommunication services
- $\sum_{i=0}^{n} CC$ – the sum of the points from all directions of “Customer care”
- 7 – maximum points that can be obtained.
- 130 – the maximum number of points on all indicators.

The average rating of all surveyed business users is obtained by the formula:

$$\frac{\sum_{i=1}^{n} BUTS_{CSR}}{n}$$

where

- $n$ - number of business users of telecommunication services

To analyze the results of the calculations, a scale is defined, including the following groups from 1 (minimum) to 7 (maximum), as follows:

- from 1 to below 2.50 - low level of involvement of the telecommunications companies with social responsibility activities aimed at business users;
- from 2.50 to below 4.00 - moderate degree of involvement of the telecommunications company with social responsibility activities aimed at business users;
- from 4.00 to below 5.50 - a considerable degree of commitment of the telecommunications company with social responsibility activities aimed at business users;
- from 5.50 to below 7.00 - a high degree of commitment of the telecommunications company with social responsibility activities aimed at business users.

The proposed model presents the perception and evaluation of business organizations as consumers of telecommunications services regarding CSR practices in the telecommunications industries.
B. Evaluation of CSR in the field of "Staff Care" from an employee perspective in telecommunications

As it became clear, every organization, including those in the field of telecommunications, chooses its own approach to disclosing information on CSR initiatives.

The influence of CSR on the satisfaction of business users of telecommunication services has been repeatedly emphasized. No less important is the opinion of the employees of the organization about the social initiatives of the organization.

A study found that one of the main areas of CSR, including most initiatives are in the field of human resources. This fact is not accidental. Undoubtedly the most dynamically developing sector is the telecommunications sector. The reason is the rapid development of technology, which requires rapid adaptation of operators, and one of the ways to do this is proper care for employees [22, 23].

The social responsibility of enterprises, including in the field of human resources, has its price. That is why it is important for business organizations what is the return on this investment or in other words what are the benefits of CSR in the field of human resources. [24]

Studies have identified the efforts of senior management, which are aimed at continuous improvement of safety and health at work for all employees within the organization.

Social initiatives aimed at human resources by telecommunications companies can be considered in several main areas that are similar to those in other organizations, namely: healthy and safe working conditions, working environment, personal and professional development, fair pay, social benefits and internship programs [23].

The implementation of activities related to increasing employee satisfaction and engagement [25,26,27,28] as part of the social initiatives of organizations leads to an increase in their overall productivity.

The development and implementation of appropriate tools for motivating and stimulating staff also leads to high overall productivity. This is achieved by studying both the needs and interests of individual employees and the specifics of the organization as a whole.

![Corporate social responsibility](image)

Fig. 3. Social initiatives of the Bulgarian telecommunication operators in the field "Staff care".

1) Fair payment, incl.

- My employer provides me with a salary in line with the labor market in the specific field (industry);
- My employer provides me with additional remuneration for good performance - bonus schemes based on the results shown;
- My employer provides me with my real salary;
- My employer pays my wages monthly on the agreed date without delay;
- My employer pays me extra for overtime.

Maximum number of points - 35 p.

2) Safe working conditions, incl.

- My employer provides me with personal protective equipment and work clothes in accordance with the nature of the work and the climatic conditions;
- My employer provides me with a safe work environment;
- My employer monitors and organizes the conduct of periodic training in electrical safety and labor protection, in accordance with the activities performed and the position.

Maximum number of points - 21 p.

3) Staff training and career development, incl.

- My employer organizes the necessary training, according to the activities performed, to increase efficiency in work processes;
- My employer provides practical training for a specific activity and technology;
- My employer periodically holds conferences and seminars to share experiences / share knowledge;
- My employer gives me the opportunity for career development.

Maximum number of points - 28 p.

4) Other social activities and benefits, including

- My employer provides me with flexible work programs;
- My employer provides additional health insurance for me and my family;
- My employer provides vouchers for holidays and other forms of entertainment (tickets for concerts, sporting events, etc.) with good results.

Maximum number of points - 21 p.

5) General issues related to CSR, including

- My employer is socially responsible to its employees;
- My employer runs CSR initiatives to attract new employees;
- My employer conducts CSR initiatives to build and maintain a good image;
- My employer participates in partnerships with other organizations / independently in initiatives related to environmental protection;
- My employer owns and applies ethical standards.

Maximum number of points in direction 5 are 5 points.
The total number of points for evaluation of the social initiatives of the telecommunication operators in the direction "Personnel Care" is 110 points. The formula is used:

$$ETK_{CSR} = \frac{\sum_{i=1}^{n} E_i}{110},$$  \hspace{1cm} (3)

Where:

- $ETK_{CSR}$ – employee in a telecommunications company
- $\sum_{i=1}^{n} E_i$ – the sum of the points from all directions of "Staff care"
- 7 – maximum points that can be obtained
- 110 – the maximum number of points in all indicators.

The average rating of all surveyed employees is obtained by the formula:

$$\frac{\sum_{i=1}^{n} ETK_{CSR}}{n},$$  \hspace{1cm} (4)

$n$ - number of employees

To analyze the results of the calculations, a scale is defined, including the following groups from 1 (minimum) to 7 (maximum), as follows:

- from 1 to below 2.50 - low level of involvement of the telecommunications company with social responsibility activities aimed at employees;
- from 2.50 to below 4.00 - moderate degree of involvement of the telecommunications company with social responsibility activities aimed at employees;
- from 4.00 to below 5.50 - a considerable degree of commitment of the telecommunications company with social responsibility activities aimed at employees;
- from 5.50 to below 7.00 - a high degree of commitment of the telecommunications company with social responsibility activities aimed at employees.

III. CONCLUSION

Telecommunications companies must focus their efforts on establishing and maintaining policies and marketing plans that include CSR to increase customer satisfaction. High satisfaction and loyalty encourages managers of organizations to invest in CSR activities, and when businesses engage in socially responsible practices, it has a positive effect on employee satisfaction and retention.

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Business Process Analysis of Remote Jobs

Victor Gladchenko

Abstract – In the last two years, the economy and standard business models have been subjected to a very serious test by the Coronavirus and the measures imposed against it. The measure for forced isolation, incl. the closure of entire industries inflicted the heaviest damage upon businesses. The businesses have taken a package of different measures to survive, and one of the most effective is the creation or increase of remote jobs.

The aim of the article is to examine how remote jobs can be subjected to business process analysis for the purpose of optimization/improvement.

Keywords – remote jobs, business process analysis, stages of business process analysis, monitoring, description.

I. THE BUSINESS DILEMMA

The measure taken by governments against the Coronavirus can be divided into several areas [1]:
- Providing safe and effective vaccines for Europe and the worldwide;
- Economic measures;
- Public health;
- Borders and mobility;
- Combating misinformation.

The measures that have caused the most serious economic damage to the business are:
- measures restricting the population’s mobility;
- measures that impose forced isolation;
- measures that require the closure of entire branches of businesses.

The consequences of these measures for the businesses covered the whole range from being severe to catastrophic:
- a large number of bankruptcies, especially among small and medium-sized businesses;
- increased unemployment;
- some of the companies, which survived had to reduce their activities and staff;
- others suffered heavy financial (but not limited) losses.

The business was faced with a dilemma:
- a huge chance for financial loss and/or bankruptcy, if it complies with all measures;
- to suffer serious sanctions and serious health risks if it does not comply with the imposed measures.

At first glance, a situation like “Lose-Lose”.i.e. the business will certainly suffer losses, regardless of their choice. But the business (or at least some of it) adapted successfully by choosing one (or more) of the following alternatives:
- completely changed its business model;
- adapted its business model to the pandemic situation;
- tried to survive independently or with the help of financial aid packages.

The changes which the business introduced in its business models led to several changes.
- Growth in online shopping (and respectively decrease in shopping from physical stores);
- Growth in courier services (accompanying the growth in online shopping);
- Growth in work through remote jobs (and respectively reduction in office work);

The first two changes (growth in online shopping and courier services) did not conceptually change standard business models, but only intensified trends.

This is not the case with remote jobs- up to 2019 they were available to a select few (limited to certain industries) exotics, and nowadays the staff is doing everything possible not to return to the offices.

II. THE PROBLEM WITH THE REMOTE JOBS CONTROL

Remote jobs certainly have many serious advantages over office jobs:
- The time and financial expenses of the staff for travelling to the office are eliminated;
- Eliminates the risk of infecting staff during travel from home to the office and vice versa;
- Eliminates the risk of infecting staff during work;
- The costs of the business for office maintenance, including office equipment and consumables are seriously reduced;
- The efficiency of the internal communication increases, even if limited to the elimination of the problem with the physical location of the employees at meetings, councils, etc. formal and business meetings;
- Increases staff productivity when working from home;
- Serious stress reduction at work (this is one of the reasons for the increased staff productivity);
- Miscellaneous.

1 Victor Sergeev Gladchenko is with the University of Telecommunications and Post, Sofia, 1 Acad. St. Mladenov Str, Sofia 1700, Bulgaria. E-mail: victor_gladchenko@abv.bg
The advantages are visible, but still a large part of the business is trying to bring its staff back to the office. The reasons for that are as follows:

- Problem in the control of the staff working hours;
- Problem in controlling the amount of activities performed by the staff during work;
- Problem in the quality control of the activities performed by the staff during work;
- The risks of losing confidential information during work;
- Problem in controlling software and hardware remote workstations (many people prefer to work on their computers rather than the office ones);
- Miscellaneous.

The common component in all the business grounds is one and the same - loss of control, i.e. most companies have to rely on the professional conscience of their employees.

The lack of control over the employees’ activities during work leads to an unexpected aspect - how to optimize business processes of remote jobs when there is no control over them?

III. THE CHALLENGES OF THE BUSINESS PROCESS ANALYSIS OF REMOTE JOBS

Business process analysis can be divided (according to the author) as related to the way of performing this task into four successive stages:

- Monitoring;
- Description;
- Analysis (incl. evaluation);
- Optimization.

Each of these stages has its tasks and means for their execution. As they will be discussed separately in detail in the follow-up topics of the textbook, at this point their execution. As they will be discussed separately in detail in the follow-up topics of the textbook, at this point their main idea as a set of activities will be explained.

First stage – Monitoring

Underestimating the information gathering stage, which in turn will be used for the next stages can (and usually does) lead to serious distortions of the results of the analysis, which will have an effect upon the company/organization in the whole spectrum of troubles from increased resource costs for correcting the error (if it is correctable) to bankruptcy/disintegration of the company/organization (if it is irreparable and /or if the error is of significance).

The key task at this stage is to collect correct, adequate, accurate and objective information about the state of the business processes system of the company as a whole and/or the specific process or process group.

The author classifies the means/methods for performing this task into three groups:

- Direct methods;
- Indirect methods;
- Documentary methods;

Direct methods include:
- Personal observation- the information gatherer is present in person while observing the process minimizing contacts with the process performers (observes, asks individual specific questions in order to clarify/explain);
- Remote monitoring- using modern remote monitoring equipment (usually cameras);
- Recordings- view videos taken (usually without sound).

Indirect methods include:
- Focus-groups;
- Interviews;
- Surveys.

Documentary methods include:
- Business documents- already described business processes according to ISO, internal regulations, etc.;
- Guides- Guides written by business process analyst for the use of software (usually ERP); Logs- the internal software records of the actions of all users of a business software (usually ERP).

Second stage – Description

The key task at this stage is the description of the collected correct, adequate, accurate and objective information about the state of the system of business processes of the company as a whole and/or the specific process or process group.

The methods/tools for description can be classified (according to the author) as related to the way of description:

- Text methods;
- Text-table methods;
- Graphic methods – UML, BPMN, ARIS.

Third stage – Evaluation and analysis

The given stage consists of analysis (including evaluation) of the business processes of the organizations by methods with simpler or more complex mathematical apparatus.

Fourth stage – Optimization

The key task at this stage is to improve the business processes system of the organization as a whole and in particular the processes under consideration.

What is the challenge for the business process analysis of remote jobs?

Business process analysis is consistent and cyclical-when the optimization takes place it is necessary to monitor, describe and evaluate/analyze its results (i.e. the first three stages) and to assess whether any adjustments or optimizations are needed:

- If after optimization adjustments are needed- the fourth stage is performed, after which it is again necessary to observe, describe and evaluate/analyze its results;
- If after optimization there is no need for additional adjustments- the cycle ends for the time being, until changes in the external or internal environment require a new beginning of the cycle.

The cycle of successive stages of business process analysis leads to the following disadvantage- if one of the processes is not performed accurately, then the accuracy and efficiency of the follow-up processes will be significantly reduced.

Potentially the most risky stages of any analysis are the stages of information collection and subsequent analysis. The stage of gathering information is especially risky, because in case of incomplete execution all subsequent
stages become meaningless.

In a business process analysis in terms of remote jobs, the same thing is valid but to a much greater extent—how to monitor (first stage) and evaluate and analyze (third stage) the activities of jobs over which the employer has significantly reduced (or no) control at all?

IV. POSSIBLE SOLUTIONS

The effectiveness of the various tools for monitoring business processes differs greatly in monitoring the activities of traditional office jobs and remote jobs:

- Personal observation is absolutely impossible in remote jobs;
- Remote monitoring by cameras is much less effective because it is possible only through the camera of the laptop/desktop computer and only with the employee’s knowledge;
  - The same is valid for the recordings;
  - There is a slight increase in efficiency in focus groups and interviews, as a certain group of employees feels more relaxed when communicating online (usually employees between 20 and 40 years old);
  - There is no significant difference in efficiency in the surveys;
  - With business documents and guides there is a slight increase in efficiency, as a certain group of employees prefers to read documents on electronic media (usually employees between 20 and 40 years old);
- Logs (i.e. internal software records of the actions of all users of a business software) show a very significant increase in efficiency in monitoring the activities of remote jobs.

The log method is usually ignored:

- due to the easier accessibility/higher efficiency of most of the other methods in monitoring office jobs) this method is neglected, except in extreme cases;
- especially often with less literate technical managers and/or staff;

What are the advantages of logs as a way to monitor the activities of remote jobs?

There are several reasons:

- the method is absolutely accurate and objective;
- the method is measurable mathematically because with the necessary settings it measures how long each action of the employee takes;
- the method allows to observe the errors in the actions of the user;
- the method allows to monitor whether the employee complies with the specified documented business processes;
- the method is extremely cost-effective in terms of costs and resources because it is automated and takes up only hard disk space;
- Employees (especially the less technically literate)

V. CONCLUSION

Remote jobs offer a large package of benefits, but at the cost of losing control of staff activities. Logs are both a powerful and often underestimated method that can solve (in most cases) the challenges of business process analysis of remote jobs.

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Some Aspects of the Virtual Project Teams

Vihra Dimitrova

Abstract – This article deals with the challenges for the project teams working in virtual environment and the performance challenges. Crises and technological innovation have influenced the changes in the working modes. Based on the statistics, more than half of the world’s employees already work remotely most of the time and it’s likely that this number will increase in the future. For companies already offering remote options, the switch to virtual teams has been easier than others. The features of the successful virtual project teams have been studied and listed.

Keywords – Virtual team, virtual team performance, remote work.

I. INTRODUCTION

In an increasingly digital world, the development of the information and communication technologies has been influencing the new concept for remote teamwork in a positive way. Crises and technological innovation have influenced the changes in the working modes. The virtual teams are a new paradigm in the modern world. The new technologies, as well as the globalization process, the organizational structures and the way of working indicate that this approach has gain importance in the recent times. The information and communication technologies have transformed the economy, enterprises, academic institutions and public authorities. In order to save time and costs, the companies have begun to recruit employees working from different locations.

Based on the statistics, more than half of the world’s employees already work remotely most of the time and it’s likely that this number will increase in the future. While the number of companies doing business in distant places is growing and there are always more teleworking employees, virtual teams are on the rise. According to the global statistics telecommuting has grown 115% in the past decade.

At the same time, for the last years the project work has spread in almost all companies and non-governmental organizations and projects have been used for realization of the organizational mission, strategic and short-term aims, while utilizing the available resources [1]. Due to the pandemic situation numerous project teams had to switch to virtual teamwork. Nowadays there is a significant growth in the number of project teams working remotely from different places around the world and facing various challenges on the way.

II. DEFINITION OF A VIRTUAL PROJECT TEAM

Powell, Piccoli and Ives (2004) define virtual teams as "groups of geographically, organizationally and/or time dispersed workers brought together by information and telecommunication technologies to accomplish one or more organizational tasks." [2]

The virtual project team (dispersed team) could be defined as a group of individuals working together on a project, but is unable to meet regularly because of the geographical distance or the different time zones and schedules [3]. The remote team depends on technologies in order to communicate and collaborate. The term could be used as well for teams using asynchronous working modes or functioning at different organizational levels.

According to Forbes, recent research shows that the skills needed to lead a virtual team are not just different from those needed to create a team whose members work in the same place [4]. Managing virtual teams requires a different approach. This means applying new skills, communication methodologies and techniques to achieve the best of the team and improve organizational and individual performance [5].

The three main aspects of the project virtual teams could be summarized in: purpose, human resources and connections.

While purpose is an important aspect for all organizations, it is the most critical aspect for virtual teams; the shared purpose is what keeps the virtual team together. Because of the lack of common organizational structure, the shared purpose is the glue that keeps the team together.

The digital virtualization of traditionally physical technological resources is also happening at the level of human resources, because increasingly the presence of employees in the same place is not necessary. This implies an immense challenge for the new electronic leadership of teams of collaborators who are increasingly dispersed geographically [6].

Different factors could influence the performance of the virtual project team members, including the way the team functions, the type of leadership, the social aspects and the use of the information and communication technologies.
III. BUILDING A VIRTUAL PROJECT TEAM

One of the advantages of hiring virtual team members is that it offers flexibility in terms of recruitment. There is a possibility to pick candidates from all over the world and look for the right project team members, who possess the necessary skills and knowledge. Having access to global pools of candidates gives the opportunity to recruit and retain high-quality talents.

The experts state it would be better to welcome the new members of the project team in person, to pair them with a mentor who can answer questions and give the opportunity to talk with colleagues and learn the important information and study the documents step-by-step.

The virtual project team needs to be planned. This means to decide what kind of communication tools will be used, how the interactions will be structured and if a face-to-face contact would be possible. Research shows that team building exercises, establishing shared norms, and building a clear team structure support team success. Kirkman et al. [7] finds empirically that face-to-face contact would be possible. Research shows that means to decide what kind of communication tools will be used.

When building a virtual team, a coherent approach to working methods must be established. It is necessary to define the shared goals, as well as to link them to the organizational strategy, where possible. There must also be clarity about the tasks and methods of work, expectations of team members and team roles. This can include all the processes, procedures and plans that the team needs to follow.

During the initial team meeting, the virtual team manager should present the goals and objectives of the project, list roles and responsibilities/tasks, define basic rules regarding the frequency of the team meetings, the way of communication and information sharing, conflict management and set the guidelines for cooperation.

There must be ongoing training in virtual teams to improve performance. For example, according to Tan et al. [8] lifelong learning increases cohesion, trust, teamwork, commitment, individual satisfaction and better decision making.

Numerous studies demonstrate that the team members’ expertise in the new information and communication technologies have a positive impact on the team performance and the participation satisfaction, along with the building of trust.

A number of studies [9] indicate that virtual or remotely distributed team collaboration can even improve employee productivity. Several models were proposed, but relative for this study is the one of the transformational leadership in the dispersed teams (Eisenberg, J., et al., 2019). It is shown that geographically dispersed teams tend to perform better when team members self-regulate performance patterns as compared with when leaders unilaterally direct teams (Kozlowski, Gully, McHugh, Salas, & Cannon-Bowers, 1996). Transformational team leaders should, therefore, not only consider being proactive and provide structure and a clear direction but also develop ways to enable team members themselves to be more involved in regulating team processes and performance [10].

Virtuality has a different effect on the team, depending on the duration of the team's existence. For short-term project teams - misconceptions about people leads to less effective teams. While building a group identity, the team overcomes the differences. It was shown that the negative impact on team performance and team conflicts decreases with increasing virtuality.

Research shows also that most virtual teams experience more conflict in tasks and lower frequency of communication, knowledge sharing, presentation and satisfaction. Although there was a negative effect on the frequency of communication and knowledge sharing, the effect was smaller in the long-term than in the short-term teams [11]. The negative effects that affect short-term teams disappear with long-term ones because of the relationships, trust and cohesion building.

IV. SOCIAL ASPECTS OF THE VIRTUAL PROJECT ENVIRONMENT

It is found a positive correlation exists between socio-emotional processes and the virtual project team results. Due to geographical remoteness, face-to-face meetings are held rarely or never. According to research, this leads to weaker social connections between team members and the team tends to be more task-oriented than socially aware.

Where face-to-face meetings are possible, they should be held as often as possible at the beginning of the team formation in order to know each other, socialize and establish good interpersonal relationships. Such meetings should focus more on building relationships than on the project tasks.

Where face-to-face meetings are not possible, other approaches may be used. Social networking could be developed partially through digital means of communication. Research shows that if the teams have the possibility to organize a “social talk” at the beginning of each meeting, they are able to build trust and establish deeper social and emotional connections. The virtual project teams’ leaders could stimulate the social networking in different ways, such as defining the roles of the members in the team, accepting their opinions and suggestions and practicing transformational leadership.

The cohesion (sense of unity in the team) is important for virtual teams and is associated with better performance and greater satisfaction. Cohesion and trust are crucial for improving team performance. Traditional teams usually have a higher level of convergence than virtual ones. Another study shows that despite the initial weak cohesion, enough social information is exchanged over time to achieve cohesion. Building sense of unity is a challenge for the virtual teams. Relationships should be a
result of inclusive and respectful interactions. The virtual teams have to strive to meet the socio-emotional needs of the individual members in order to make function the virtual team successfully and achieve the project goals.

Group cohesion for virtual teams with members working at different geographic locations, for different organizations, and even in different sectors of the economy, need effective communication and close coordination to achieve goals [12]. Concerning the efficiency and effectiveness of the virtual project team, the coordination, the way of communication and the knowledge sharing are crucial.

Building trust is a rather sensitive issue for virtual project teams; because there is a doubt whether people could trust each other without a personal contact. In addition, it is observed that trust is essential for successful teams, but there is usually not much time for its gradual development, because often teams have a short life within the project. To build trust in the early stages of group life, the team must focus on socialization and communication, deal with the technical uncertainty and establish warm interpersonal connections. In the teams where there is trust, there is also effective communication, positive leadership and the ability to switch from social communication to task-oriented communication. The openness of each member of the team is important for building trust and the perceived trustworthiness of the other team members have positive effect on the project results. A face-to-face meeting in the early stages of team building before it becomes virtual, fosters strong trust [13].

The virtual project team leader should be consistent in his approach and predictable in his actions in order to build trust. He should provide appropriate recognition for the work of the team members in order to make them feel respected and valued. Another useful behavior is to demonstrate interest towards the team members in social, family and personal aspects.

In order to build a successful virtual team there should be also effective communication, high emotional intelligence, ability to work independently, intercultural awareness and persistence. Virtual teams need to execute and learn at the same time.

V. EFFECTIVE USE OF TECHNOLOGY AND COMMUNICATION

Technology is one of the main reasons why virtual teams have become so numerous in the last decade. The development in the ICT sector has allowed us to connect with people and communicate in much more effective ways than we have ever done before. Nowadays the technologies are more and more advanced, which result in increased remote work that no longer means being isolated. However, the very tools that make virtual teams so possible now can also cause problems if not used properly.

If not used properly, technologies could increase confusion, cause unnecessary interruptions and lead to significant loss of time.

The communication and collaboration could be a challenging task for the members of the virtual team because of the geographic distance. Virtual teams rely significantly on communication technologies to coordinate their work. Research published in the Harvard Business Review states that remote employees are more likely to report feeling that colleagues mistreat them and leave them out [14]. It is rather difficult to build trust, connection and shared purpose in a remote team. At the same time most of the remote employees experience reduced productivity and results, with more stress and sense of isolation.

Communicating remotely with people from different social and cultural backgrounds can be challenging. Coordination problems and barriers to effective communication related to cultural differences may also arise. This includes the possibility of errors and misunderstandings in communication and incorrect decoding of the message by the recipient. In order to solve these challenges the intercultural awareness, understanding and acknowledgement the cultural differences should be a priority.

Concerning the communication tools used for virtual teamwork, the best would be to use a platform that integrate all types of communication, providing a possibility for conference calling (with recording option), direct calling and text messaging (for real-time conversation between two remote project team members), e-mail communication, discussion forums or virtual team rooms (in order to present issues to the entire project team in complex projects), shared spaces (for document sharing or collaboration platforms). These kinds of platforms become the centre of team activities and the teams become more effective and efficient.

For the successful communication in a virtual team it is necessary:
- Team members to be stimulated to learn all forms of communication through new technologies;
- To create clear rules on how, when and how often the joint communication will take place - virtually and personally;
- Team meetings should be scheduled in the right way - the initial face-to-face meeting is mandatory, but the rest may be virtual;
- To plan frequent communication with team members - daily, if possible;
- To provide the best technologies to facilitate the functioning of the virtual team.

It is worth noting that communication is the only method that ensures the successful management of the virtual team. This is because the effective communication keeps virtually connected team members with colleagues and their manager. That is why a good virtual manager will provide an effective approach to team communication.

VI. MANAGEMENT OF THE VIRTUAL PROJECT TEAMS

The appropriate management of the virtual project teams is crucial for the success of the project. Virtual teams require new ways of working across boundaries through systems, processes, technology, and people, which
require effective leadership." [15]

One of the aspects of the effective management of the virtual project teams is the empowerment of the team members. Empowerment is favorable acknowledgment by the team leader and allows team members to participate in decision making [16]. Different studies found that there is a positive relationship between team empowerment and team performance [17].

Different studies suggest that if virtual project teams are well managed, they can outperform teams with common office space [18]. The skilled virtual project managers are able to encourage habits that lead to trust, connection and shared purpose.

The lifecycle of the virtual project team management has five stages [19]:

1. Preparation/planning - the initial task in building a team is to define its main goal, as well as determine the degree of virtuality that may be appropriate to achieve these goals. Management activities related to this phase include mission formulation, task definition, remuneration system planning, selection of appropriate technology and organizational integration;

2. Start / Kick-off meeting - it is strongly recommended that when starting the activity of the virtual team, all members meet face to face. For the virtual project teams it’s important to meet in person at least for the kick-off meeting. This is a condition to build trust and establish personal relationships, to “swift trust” that will allow the project team to work together before the long-term bonds develop. The important aspects of the "kick-off" meetings are: getting to know each other, defining the project team goals, clarifying the project team roles and tasks, training for effective use of communication technologies and identifying the basic rules for the project team work. As a consequence, kick-off meetings are expected to contribute to clarifying team processes, building trust, creating a shared interpretive context and strong identification with the team. Mutual acquaintance, clarification of objectives and development of intra-team rules are also part of this stage. Experimental research shows that getting to know team members before starting virtual meetings facilitates collaboration and trust;

3. Performance management - after the start of the team's activities, efficiency and a constructive team climate must be maintained, using performance management strategies. The main topics are leadership, communication in the virtual team, motivation of team members and knowledge management. Leadership is a major challenge in virtual teams. All forms of direct control are difficult when team leaders are not in the same place as team members. As a consequence, the principles of delegating management are used, in which part of the classic management functions are directed to the team members. But team members accept and perform such management functions only when they are motivated and identify with the team and its goals, which is again more difficult to achieve with virtual teams. Communication processes are perhaps the most frequently studied variables that are relevant to the regulation of the work of the virtual team. By definition, communication in virtual teams is based mainly on electronic media such as email, telephone, video conferencing and more. The main concern here is that electronic media reduces the richness of information exchange compared to face-to-face communication. One of the most important needs for successful communication is the ability of all members of the group to be present repeatedly over time. In connection with the management of motivational and emotional processes, three aspects are considered: motivation and trust, identification with the team and cohesion, satisfaction of team members;

4. Team development - virtual teams should be supported through staff and team development interventions. The development of such training concepts should be based on empirical identification of the needs and deficits of the team and its members, and the effectiveness of training should be re-evaluated empirically. Steps for team development include defining needs / deficits, individual and team training, assessing the effects of training. Assessing the behavior of team members in order to identify behavioral signals can improve the dynamics of the virtual team and increase productivity [20]. Some of the ways managers can improve the growth and success of virtual teams include monitoring trust levels, focusing on improving communication, improving inclusion through emotional security in the group, and actively and frequently discussing teamwork;

5. Disbandment - the disbandment of the virtual project teams is an important issue that has been neglected not only empirically but also conceptually. It is especially important to carefully and constructively disband and reform short-term virtual teams in order to maintain high motivation and satisfaction among employees [21]. The final phase of group development should be a gradual emotional withdrawal, which includes both sadness of separation and joy and pride in the achievements of the team.

The role of a leader requires a set of basic skills and abilities and the leadership of virtual teams is no different. There are some highlights in these skills and issues such as communication, performance management and people development that are similar for all leadership roles. However, it is obvious that the leader of the virtual team must develop certain competencies and skills in addition to those needed in the more traditional leadership position. The additional key areas of skills include: information and communication technologies skills, ability to build trust, results-oriented, networking skills and strategic thinking.

Trust is a key factor when talking about leadership in order to build and maintain a successful virtual project team.

The leader of a virtual team has the responsibility to build and develop trust in the team. This does not only mean the existence of trust between the leader and each member of the team; it also means trust between team members. The key to this is to be open, honest, available, responsible and consistent and encourage others to do the same. Team members will try to follow and imitate the behavior and actions of their leader. Therefore, the leader must serve as a model and demonstrate the behavior he expects from his team.
A recent study of engineering groups showed that the best predictor of success for managers leading dispersed teams is experience doing it before. The virtual teams leaders could excel by practicing some key behaviors that, while also critical in face-to-face settings, must be amplified in virtual one [22].

Some of the important rules for the virtual teams and the leaders' behavior are:

- **Trust** is important for every team, but it’s even more difficult to build in a virtual team. Trust is built over time by establishing good interpersonal relations and persistence in the leadership style.

- **Personal kick-off meeting**: If there is a possibility the virtual project team members should meet in person during the first meeting.

- **Relationship building** is another important aspect. There should be a possibility for a “social talk” where the team members could share recent professional success or personal news. It would be useful to organize face-to-face meetings from time to time. The behavioral guidelines during the virtual teamwork should be clarified.

- **Open dialogue**: It’s related to building trust. Leaders should encourage team members to share their opinions and suggestions, as well as expectations, their contribution to the teamwork and their preferred working methods. This will improve communication and collaboration in the virtual team.

- **Providing recognition**: Virtual project team members need recognition for their efforts and the accomplished tasks. People will be more motivated.

- **Establishing rules**: This would help to reduce uncertainty and enhance trust, as well as increasing productivity.

- **Common purpose or vision**: It’s important to define a common purpose, clarify team goals and include everyone in the decision-making.

- **Study the individual needs and ambitions**: of the team members.

- **Clarity**: Virtual team members should have clarity about their roles and tasks. At the same time they need to be as much specific as possible when formulating a query or request. It would be useful to summarize all the information in a written form after a conference call for example, in order to avoid misunderstandings.

- **Presence**: Virtual collaboration requires mental presence and engagement and that is why multitasking should be avoided.

The application of the presented rules, typical for the successful virtual project teams, would contribute to improve the management of the teams, the communication and collaboration among the participants, the performance and the productivity, as well as the well-being of the virtual team members.

**VII. CONCLUSION**

The virtual project teams in the past were formed in order to save time and costs and to facilitate innovation among professionals around the world. Nowadays the virtual project teams are more often just a necessity of doing business. Despite the accelerated development of information and communication technologies and the dynamic environment of modern global society, as well as overcoming distance as an obstacle to cooperation, working in a virtual team still causes problems that seek their solution. Shared knowledge is an important element in the successful construction and operation of virtual teams. With the right training and gaining the necessary skills, each leader of a virtual project team could adequately guide the processes in the team itself, its effective functioning and building trust among its members. And finally, companies can boost virtual project teams’ performance and productivity by following the above mentioned practices.

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The Smart Specialization as a Factor for Innovation and Economic Growth

Vihra Dimitrova

Abstract – The current article briefly reviews the European and national policy in the field of regional development, as well as the regional innovation strategies as an instrument for socio-economic development. In the current situation it is necessary to combine sustainable and smart growth, especially by implementation of strategies for research and innovation, related to smart specialization. The regional and local perspectives become more and more important while fostering sustainable growth. More than ever the innovations should be localized in order to serve the market needs. The features and the contents of the innovation strategies for smart specialization have been examined.

Keywords – Innovation, smart specialization, regional innovation strategies, economic growth

I. INTRODUCTION

The current economic crisis underlined the necessity of restoring the balance between the public sector finances at national, regional and local level. The reasonable public expenditures should not lead to reduction in investments in the field of human capital, innovations and research, since these are the main elements for stimulating the economic growth [1]. The basis of the successful development, functioning and competitiveness of every economic system in long-term perspective is the effectively developed innovation activity. The development and application of scientific-educational programs is the main part of the innovative development of a modern society.

II. EUROPEAN AND NATIONAL REGIONAL DEVELOPMENT POLICY

The formulation and implementation of Regional development policies creates conditions for the balanced and sustainable integrated regional development. The instruments for regional development provide financial and other support to the regions that are economically challenged. The regional development could be national or international by its essence.

In the context of the EU Directives the regional government in our country follows the main principles of partnership and subsidiarity. The National strategy for regional development (NSRD) for the period 2012-2022 [2] has been developed according to the legal regulations (Regional development act). The NSRD is the main document defining the strategic framework of the state policy for achieving balanced and sustainable regional development and overcoming the disparities in and among the regions in the context of the European cohesion policy and smarter, sustainable and inclusive growth.

In order to achieve social-economic development and increase the employment it’s important to combine the sustainable and smart growth using a strategy for research and innovations for smart specialization.

III. REGIONAL INNOVATION STRATEGIES

The most important regional issues are the scientific diplomacy, the smart specialization and the research infrastructures [3].

The regional and local perspectives are becoming more important than ever in fostering the sustainable growth. The regions know the local innovation systems and have the capacity to mobilize the economical players in the name of a shared purpose.

The Innovation strategy for smart specialization is of great importance for the realization of efficient measures for enhancing the competitiveness of the industry on the basis of new knowledge and ideas. The Council of the EU highlights the term “smart specialization”, which allows every region to build on its own achievements by defining priorities in the national and regional innovation strategies.

In the Commission’s proposal for the Cohesion policy for the period 2014-2020 [4] the development of an Innovation strategy for smart specialization was an obligatory precondition for the Operational program period (2014-2020). However, the new challenges that the European Union faces require even more efficient management of research and innovation budgets, and this resulted in a series of analyses and communications from the European commission.

The EC defined the concept of smart specialization and provided orientations for the regions and Member states on how to develop research and innovation strategies for smart specialization in a Guide on Research and Innovation Strategies for Smart Specialization (RIS3), published in May, 2012 [5]. In November, 2012 the EC

1 Vihra Dimitrova is with the University of Telecommunications and Post, Sofia, 1 Acad. St. Mladenov Str, Sofia 1700, Bulgaria. E-mail: vihra.dimitrova@abv.bg.
published at the Platform for smart specialization the next guidance „Connecting Smart and Sustainable Growth through Smart Specialization” [6], which purpose was to assist the Managing Authorities of the ERDF in integrating sustainable growth objectives into their research and innovation strategies for smart specialization.

The innovation strategies for smart specialization (ISSS) are an integrated program for transformation of the local economy by strengthening the research and technological development, innovation and facilitate the access and use of information and communication technologies.

The steps in the elaboration of such kind of strategy could be summarized as follows:

- Analyzing the regional innovation and action potential;
- Setting out the ISSS process and governance – providing participation and involvement;
- Developing a shared vision for the future of the region;
- Identifying the priorities and setting goals;
- Defining an action plan with a coherent policy mix;
- Integration of the mechanism of monitoring and evaluating.

Concerning the new program period, a project was developed, called “Efficient and Transparent Smart Specialization Policy of Bulgaria 2021 – 2027” and funded under the OP "Good Governance" under the Procedure "Increasing the Citizen Participation in the Processes of Policy Making, Implementation and Monitoring".

The project aims at developing a concept for a transparent and effective innovation policy for smart specialization of Bulgaria for the program period 2021-2027, which reflects and develops the national innovation potential and the competitive advantages of the regional business communities on the basis of the entrepreneurial discovery as a tool for building an entrepreneurial and innovation culture and active citizenship of all stakeholders.

The main activities will include diagnostics of the innovation policy pursued so far; analysis of business needs; good practices in the implementation of smart specialization strategies; analytical provision of financial and non-financial instruments to promote entrepreneurial and innovation activity; preparation of a concept and recommendations for the development of an innovative strategy for smart specialization for the program period 2021-2027 [7].

Bulgaria’s main achievements in the field of innovation policy during the period of EU membership include both the actual payments made under the operational programs, as well as the absorption of funds directly through the European framework programs; foreign direct investment in high-tech sectors and research; implementing a range of sustainable, social and open innovation initiatives; the improved administrative capacity of the central and local authorities in working with European programs and in providing services to businesses.

ISSS 2021-2027 r. updates the achievements of the ISSS 2014-2020, but the programming and application will be in rather different international, European and national context. The decision of the EU Member States to support the EU Green Deal requires a total transformation of the production ecosystems in two main directions – ecology and digitalization. This would require not only innovation restructuring of the production processes in the enterprises, but also the development of a new public-private infrastructure allowing a transition to renewable energy as well as industry digital transformation using the technologies of Industry 4.0. At national level, Bulgaria should overcome not only the abovementioned challenges but also the economic consequences of the global pandemic situation, resulting in higher unemployment and decrease in the GDP [8].

Innovations are a key factor for growth and competitiveness. European initiatives and developed countries’ practices confirm the need for sustainable, innovation-oriented behavior as the only possible approach to maintaining high competitiveness.

More than ever the innovations should be localized in order to serve the market needs. The small and medium enterprises, as well as the individuals, could be as innovative as the big companies. The way the business innovates in XXI century is totally different than in the past. The innovations are driven by the human creativity more than by the scientific research.

The regions are the most appropriate level for stimulating the innovations. The regional authorities have important competences and resources in the innovations field. Their geographical closeness facilitates the acquiring, gathering and using of knowledge. The region’s performance depends not only on the enterprises and research institutes capacities, but also on the interconnection between the stakeholders and the organizations, which develop knowledge and know-how with the time.

Regional economies are the key to innovations and growth. There is a variety of evidence and good practices confirming that the regions and the cities play an important role in the innovations development by creating industrial clusters, competence centers, incubators, technological parks and many more formal and informal innovation spaces. The successful regions and cities become European and global innovation centers, technological networks and value chains [9].

The regions have a significant role also in the sustainable goals because of their vicinity to the ecological problems and the local know-how for overcoming and adapting to the ecological challenges.

The EU Innovation Policy focuses on the networks that connect the business with the environment (companies, Universities, Research institutes) and are active mainly at regional level, e.g. in the field of the cluster initiatives.

Clusters are geographically connected network, interconnected or completing competitive companies with active channels for business relations, communication and dialogue, which use common specialized structure, labor market and services and face common development possibilities and/or threats.

In the Innovation strategy of Republic of Bulgaria [10] the cluster approach is recognized as a key factor for fostering growth and increasing the competitiveness of the Bulgarian SMEs.

With the growing significance of the regions, the levels of
cohesion in government are more important because of the state budget limitations. For example, in Belgium, Germany and China the regional share in the expenditures for innovation and development are at least 50% and this number has been growing for the last years in most of the countries.

Taking into consideration the abovementioned, the following recommendations could be made:

- The innovations are a key factor in the regional development policies – e.g. Regional innovation clusters;
- Reasonable use of the financial resources in coordinated innovation policies at all levels;
- The regional innovation strategies should define, follow and evaluate the achievements; should be directed to the administrative regions, but also to economic zones; recognition of the regions’ role in the complex global networks, supporting the innovations; enhanced investments’ revenue from the public sector.

IV. SMART SPECIALIZATION

The key part of the Europe’s efforts to support the Member states and the regions to overcome the recession and the economic crisis is the “smart specialization” – innovation strategy for local oriented economic transformation.

Smart specialization implies that a Member State or region selects a limited number of priorities on the basis of its own strengths and comparative advantages and where there is the highest potential for lasting impact. This approach will help regions realize their innovation potential and refocus their industrial and knowledge structures in the direction of emerging industries and services, and international markets. The aim of smart specialization is to transform economies towards higher added value and more competitive activities [11].

The smart specialization requires a process of vision formulation, identification of competitive advantages, definition of strategic priorities and use of smart policies for fostering the development potential of every region, without taking into consideration even the law or high technological development.

The smart specialization is the way forward, representing a combination of economic growth and wise public resources expenditures. That is why the smart specialization was a key activity of the “Innovation union” [12] as part of the Program for smart, sustainable and inclusive growth.

We could define the smart specialization as a policy of new generation in the field of the scientific research and innovations that is not part of the traditional investments in research and technologies, including building joint capacity for innovations.

In the database of this strategy are taken into consideration not only the typical issues of scientific research and skills development, but also all the advantages, e.g. geographical position, population structure, climate, natural resources, as well as the demand, the society needs, potential clients and innovations in the public sector. The region is encouraged to combine its unique local knowledge and production capacity in new combinations and innovations.

The smart specialization requires clear idea about the strengths and weaknesses of a region that needs to be combined with strong leadership position and common vision of the stakeholders in the innovations field. The key for defining the regions with a potential to be different and more competitive is the “entrepreneurial discovery process”.

This entrepreneurial discovery is an interactive and inclusive process in which the relevant actors identify new and potential activities and inform the government. The government assesses this information and empowers those actors most capable of realizing the potential. This process is what mainly distinguishes Smart Specialization from traditional industrial and innovation policies [13].

The important stakeholders in the process of smart specialization are the research institutes, higher schools, creative sectors, public authorities and the civil society.

There is a clear necessity for the regions to focus on their potential strengths and should be considered their international aspect, together with the national and regional aspect.

The aim of the strategies for smart specialization is to encourage the experiments in the existing and new fields of activity and to adapt the policies accordingly, which requires effective and active coordination of the political and strategic interventions.

The evaluation of the regional situation done by the Institute for prospective technological studies (IPTS) [14], reveals that the regions face difficulties in the establishment of global perspective and internationally oriented dimension.

The development of strategies for research and innovations for smart specialization is a difficult task, especially for the national states that don’t have a long tradition in the elaboration of innovation policies with the participation of the stakeholders or lack experience in the application and evaluation of the policy.

These strategies could become a challenge even for countries with a functioning innovation environment because it’s necessary to identify and make difficult decisions. That is why the European commission created tools (Platform for smart specialization) in order to support the member states and the regions to develop their own strategies for smart specialization.

For Bulgaria is important to plan in collaboration with the other EU member states the future measures for achieving optimal effectiveness of the programs and initiatives supporting the research and innovations in Europe.

Differently than the innovation process in the developed countries, the innovations in Bulgaria grow in environment of instable economy, lack of private investments, which could contribute for the elaboration and use of the most modern technologies. In order to achieve this goal an integrated innovation policy should be developed and give priority to the Bulgarian scientific-technical complex and enhance the production competitiveness on the internal and international market.

The approaches for formulation of integrated innovation policy are:
System approach;
- Priority development of the scientific products;
- Clear definition of the sources for financing of the priority sectors;
- Development of innovation system on the basis of scientific-technical, intellectual and financial possibilities of the country.

In order to guarantee the efficient innovation activity a state support is necessary, development of state scientific-technical sector and establishment of a clear scheme for funding the innovation programs and projects with public resources.

The innovations are important part also of the globalization process and necessary precondition to gain competitive advantage.

Collaboration in research and innovation is one tool to foster digital partnerships with regions around the world. International digital partnerships should result in greater opportunities for EU companies, increased digital commerce via secure networks, respect of EU standards and fundamental rights and values, and a supportive environment internationally for a human-centric digital transformation [15].

In the recent times, more than ever, the research and innovations should be focused on the solutions of the key society challenges in the area of digitalization, healthcare, demographic changes, sustainable agriculture and bio economy, clean and effective energy, smart integrated green transport, ecology and climate, resource and raw materials effectiveness.

The G7 Science Ministers in their meeting of October 2015 widely recognized the progress achieved in the Innovation Union over the past years and highlighted the enhancement of the level of interaction in order to “identify potential opportunities, risks, gaps, or overlaps in capability enhancement of the level of interaction in order to "identify Innovation Union over the past years and highlighted the progress achieved in the EU’s competitiveness. In May 2021, the European Commission adopted a Communication on a Global Approach to Research and Innovation — Europe’s strategy for international cooperation in a changing world (COM (2021) 252 final). This Communication underlines the EU’s desire to play a leading role in supporting international research and innovation partnerships, while delivering innovative solutions that support green and digital solutions in line with the sustainable development goals. It engages EU to promote resilience, prosperity, competitiveness, economic and social well-being [17].

V. CONCLUSION

We could conclude that the innovations are the main source of sustainable and smart growth in all the countries. In the definition for the new growth models, directed towards social and ecological sustainability, the regions are key factors in the formulation of virtuous innovation trajectories and in mobilizing the unused potential for national growth. An international dialogue is needed in order to exchange good practices among the governments. The smart specialization requires the policy-makers, as well as the other stakeholders, including the enterprises, to adopt a long-term vision. At the same time it reflects the necessity for taking difficult decisions in a period of hard transition in a situation of strict budget restrictions.

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C Programming Language – Stay at the Core and be on the Top

Egnar Özdikililer¹

Abstract – In the scope of this study, in parallel with the development of programming languages, the long-term use of C language and its superiority in the sector are examined and explained. Although it is a more useable programming language, it has been determined to have an indisputable place in every field of technology. It is also predicted that it will remain on the agenda for many years in the algorithm development, control software, and microprocessor levels with the features it carries. This study can be a good eye-opener for those who want to learn about the software industry and programming languages and are looking for a starting point.

Keywords – C programming language, algorithm development

I. INTRODUCTION

In the last 20 years, the concept of software has left its meaning as a job, and transformed into a lifestyle. In the era of rapidly developing technology, day to day need for growing software knowledge and development is certainly crucial. “Is Software Developer a profession or a talent?”, this question was thought from time to time unanswered, with many thinking processes.

Being a developer, like in every career, starts with having a passion for it. Even though this idiom is almost a cliché, it also has a modern point of view. Because reviewing the product ensures that a product does not get the prediction and success for an event that it produces. Because writing the code, developing a new product, in the hands of a person that looks at it as a “job” will not always lead to targeted satisfaction and success. Every software developer’s story is different, like poets. Everyone's wording, style, writing style, and the coding language that they write differs. That is the reason why each person’s success is different. Because the passion manages the developer. It is precisely this passion that both binds the developer to its profession, and makes their coding language to be uniquely important in the massive ocean of coding language. In the wide range of programming languages, besides the languages that are developed and used on a topic-based basis, there are also basic languages that allow writing powerful applications, bring life to a pile of iron, and create new languages and phenomena. One of these languages is C. C is a very powerful structure that started in 60, continuing till our day, and it is still in the agenda. This article is to open up the secrets of the C programming language and to applaud it a bit.

II. SHORT HISTORY

The superior person who carried the computer world, especially the C world, to immortality, the person I mentioned above who wrote code with passion - Dennis Ritchie. I am one of those people who used his works, wanted to get to know him like every other software developer, saw him as an idol, tried to reach him, but failed. He is a person who has shaped computer science and influenced humanity, not for one, maybe for several generations, with his works, studies, techniques, algorithms he devised. When C is mentioned, he is a superior software developer whose name cannot be passed without being mentioned. He had a passion that changed the software world.

Dennis Ritchie is best known as the creator of the C programming language and the developer of the Unix operating system. After Ritchie graduated from Harvard University, in Bell Laboratories in the 1960s the C journey started, and in the 1970s he introduced the main structure of the current version of the C programming language [1]. Even though it was named C language, before the realization phase it was first written as a B language. In 1978, after Ritchie published the book "The C Programming Language" with Kenneth, the C language gained popularity that continues to this day[2]. Ritchie met his duo Thompson at Bell Labs, which this partnership turned into writing a C-based UNIX system [3]. The successful project, which has remained at the top for years, has struggled even with languages derived from it, and has never stopped developing and progressing.

Perhaps, editing C, which was made in 1967, offers both such "base" and coding power to the processor components that need to perform incredible functions. In these times, C is used in the coding of almost all operating systems. C, rather than only being a programming language, deserves to be a standard. Likewise, it did not take long for it to become an official standard. In 1983 the “American National

¹ Egnar Özdikililer is with the Istanbul Technical University, Faculty of Aeronautics and Astronautics, Istanbul, Turkey and University of Telecommunications and Post, Sofia, 1 Acad. St. Mladenov Str, Sofia 1700, Bulgaria.
E-mail: ozdikililer@itu.edu.tr / ozdikililer@gmail.com
Standards Institute (ANSI)” established a review board and in 1989 approved the version of C known as ANSI C. ANSI X3.159-1989 was released as “Programming Language C”. The next standard studies are the versions valid all over the world, standardized by the “Internationals Standards Organization (ISO)”. After the ANSI C standard was approved, it was revised in 1999 and in March 2000, the C99: ISO/IEC 9899:1999 standard was accepted as Standard C[5]. Today, most of the C programs are coded to the ANSI C standard. It is quite advanced and can be used with many compilers.

III. PROGRAMMING WITH C

In C, code is compiled every time, before working and errors in code are displayed after checking. During its development, software developers always highlight its portability between compilers and fast compiling processes. While the portability of the language is a plus, nowadays, code written with online compilers can be run even though they are not very comprehensive. Having libraries, and at the same time being able to be written, added, and shared by software developers, as well as minimal code capability is very advanced and useful. As much as the pointer structure supports the language as data usage, power, speed, flexibility, and space usage also make an unforgettable contribution. Although the C language is described as difficult to read, it has been adopted by users because it helps fix many errors in other same-level languages.

C totally is a general-purpose programming language and is usable in many platforms for any device. For example, it can work on embedded systems and data acquisition systems, in any microprocessor with a designed C compiler. Moving easily between microcontroller families is a common skill of C programmers. They are able to write software in a fastly timed manner, and they are able to create codes that are easier to maintain and understand [4,5].

Creator Ritchie started system programming with ANSI C concept with UNIX, and today, the majority of computer systems use this version of C. C also has tools for system architecture, data, and structured programming. These technical features make C indispensable. Designed with a pointer mentality, C has direct memory access and performs memory management tasks easily. It is a low-level and high-level language at the same time. With direct memory access and “it allows a structured mode of user interface with the computer” [5]. The simple C program structure are shared in figure 1; This is a simple code for “todo list”, writing using struct type definition.

In this scope of the research, we do not intend to teach the C, but we will not be able to proceed without specifying its building block features. The C programming language is very effective in learning programming logic. Along with playing an important role in the development of the Unix operating system, it has gained importance over time due to its use in almost all operating systems. Another advantage is that it is portable and offers the opportunity to run in any environment.

C is one of the first programming languages programmers prefer to write in, and we can summarize the features as follows:

- C is a fundamental language. Command and function instructions are close to the English language, which makes it understandable for those trying to learn basic programming.
- It is used in the smallest and basic parts of programming, which makes the developers happy, who dominate the results as they develop and try to learn by taking satisfactory steps.
- The fact that it has a globally approved and accepted standard structure reveals the power of its usability level.
- It offers the opportunity to add easy-to-develop, personal libraries.
• The command operation and compilation interface are simple and clear.
• It has a modular feature so, by creating a comprehensive range of commands/functions, it can be called and used at any time.
• It is a language that uses the concept of a loop very efficiently. For example, it uses loop patterns such as for, while, switch case, do-while.
• Conditional commands such as -if, if-else, then can be used.
• The C programming language contains a wide range of data. Data types execute operations in memory as soon as data and data types are encountered in the program. The most common data types used by C are int, char, float, double. The void data type is used for "return nothing".
• With -C, arithmetic operations become considerably easier. In operations, data arrays are used.
• It is a language that can be developed and modified to allow the production of new software. For example, it provided the emergence of programming languages such as C++, C#, Java, Javascript, PHP.

IV. STATISTICAL INFORMATION

Since its emergence, it has managed to stay at the top for many years and has gradually increased its usage area. In line with the statistical information analyzed, it may be said that the vast majority of the software market has been monopolized by C for many years. For example, statisticsanddata.org "The Most Popular Programming Languages – 1965/2021?", in this statistical study in the article, it was pointed out that the C programming language managed to stay at the top for about 50 years, with a high rate of 29.3. It should be noted that the 4 languages that follow it also have C in their backbone, or they were coded using C. The adventure of Top10, which started in the 1st quarter of 1975, even in the 80s reached first place with 72%. Despite the incredibly rapid proliferation of programming languages, it has kept its dominance in Top3 until today. A very detailed video has been shared in the relevant link [6].

As it can be seen in the world giant TIOBE, the struggle between C and Python is evident. In the figure below, among the 100 programming languages listed in TIOBE Programming Community Index for September 2021, C and Python are in the top 2 respectively with ratings of 11.83% and 11.67% [7]. After this ranking list, we start to wait for the October ranked list. Is C’s prime coming to an end? Expected became real, and we can read in TIOBE Programming Community Index List for October 2021, in the ranked list Top2 changed from C to Python with 11.16% and 11.27% [7] (Fig. 1)

At the end of the year, this small difference made the Python language officially the most popular language in October 2021 [7] (Fig. 2). The Python code is written in C, as can be seen on GitHUB [8].

V. CONCLUSION

Replacing ANSI C with any other programming language is the most significant debate topic in the development world. Researchers and/or IT Specialists’ opinions are always divided into two. In addition to a section that is always more generalist and wants to continue with C, there are also those who want to give a chance to new languages with new and more ergonomic use, understanding, and user-friendly advantage. The important thing is that programmers of all levels find a development environment in C. It is the most used system programming language in the world. From microcontroller/microprocessor to robot, from algorithm to data analysis, the C backbone tests countless solutions. This is the reason why it has been in the core with the smallest parts for years, and it is used in the largest structures, and it has always stayed at the top.

![Fig. 2 TIOBE Programming Community Index - September 2021](image1)

![Fig. 3 TIOBE Programming Community Index - October 2021](image2)
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Relations Between Computer Engineering and Remote Sensing Science

Egnar Özdikililer¹

Abstract – The rapid development of technology has also increased multidisciplinary interaction. For the last 20 years, one of the popular interdisciplinary engineering purposes for computer engineers is an interest in remote sensing science and technology. As in all fields of science and industry, complex structures and repetitive data masses have increased in remote sensing issues, resulting in the need to train experts on the subject. The interoperability of distributed systems hosting large data pools has also contributed to the reduction of incredible resource consumption and shareable engineering efforts. Within the scope of this study, it will create a vision about the realization areas of computer engineers in the sector and what can be done in remote sensing science.

Keywords – Remote Sensing Science, Computer Engineering

I. INTRODUCTION

Since ancient times, the subject of information about our planet has always been a matter of curiosity. Humankind is interested in all the aspects of the world we live in, with its visible or invisible matters. Parallel with the developing technology, science and methods also develop at the same speed. When humans can not use their sense of touch, they realize that they can obtain information by watching and following it from a far, they try to use this to learn about the world, and they have used this path since these times. Humans continue to realize what is going on in the world with developing technologies, with eyes, which are perceived with touching them.

Today, at this point, it is possible to obtain information in almost every branch with the technologies offered by remote sensing science. "Remote sensing" is a concept that was used by Evelyn Pruitt in the US - Office of naval research in the 1950s. [1]. "Remote sensing is the science, and to some extent, art, of acquiring information about the Earth's surface without actually being in contact with it." [2,3].

Other definitions are; "Remote sensing defined as the technology of measuring the characteristics of an object or surface from a distance. It is the acquisition of information about an object or phenomenon without making physical contact with the object and thus stands in contrast to on-site observation" [4]; Dr. Nicholas Short: "Remote sensing is a technology for sampling electromagnetic radiation to acquire and read non-immediate geospatial data from which to pull info more or less features and objects on the earth's land surface, seas, and air". In addition; "Remote sensing is the science of acquiring information about the Earth's surface from a distance." [5]. As seen in Remote Sensing Fig.1, there are many areas that can be studied and studied within the framework of the electromagnetic spectrum.

When we look carefully, we can draw attention to many subjects in the image that we would like to examine. Each of these can be arranged as a subheading of remote sensing science. The first thing that attracts attention is the daylight, and the first question that comes to mind is; Is remote sensing applicable only in daylight?! The answer to this issue is that remote sensing is a process that can be performed continuously, it can be divided into two groups as active and passive. In the first application, the investigations started by attaching a camera to the birds then advanced with devices such as balloons, airplanes, satellites, and drones, and nowadays almost every piece of information can be accessed and studied, without being there, from afar.

When the image in Fig.1 is examined, it is seen that the remote sensing process, which seems to be complex, is actually a very sequential and easily understandable system when it is followed within the framework of its own rules and examined together with its basic principles. As it is known, the painting that we can see in the daytime thanks to the sun's rays is provided with a combination of three basic colours (RGB: red, green, blue).

In the related image, it is indicated as the visible portion of the spectrum. All other parts are fragments that we cannot examine with the naked eye. Here, we can carry out numerous studies with the knowledge we will gain on short and long wavelengths in the electromagnetic spectrum.

II. REMOTE SENSING

The purpose of this study is not to provide information about Remote Sensing Science and its operation. Our aim and the point we aim to examine here are the interoperability qualities it has with Computer Science. When Remote Sensing should be in communication with Computer Science... The answer to when it should be always because while obtaining information remotely, the intermediaries we

¹ Egnar Özdikililer is with the Istanbul Technical University, Faculty of Aeronautics and Astronautics, Istanbul, Turkey and University of Telecommunications and Post, Sofia, 1 Acad. St. Mladenov Str, Sofia 1700, Bulgaria. E-mail: ozdikililer@itu.edu.tr ORCID ID: 0000-0002-9042-2324
use are managed with certain software, and the information and data received afterward, using another group of software enables us to obtain meaningful information.

Remote Sensing has a wide range of application areas with a strong discipline. Usually, with the concept of remote sensing, it is understood as remote sensing with satellites.

In the field of satellite communication, it works with signal and image processing techniques, different features of satellites, and instruments. However, the areas that remote sensing studies contribute include ecology, climate changes, Hydrology (water quality analysis), place, change detection for Land cover, building coastal changes, damage analysis after fire or hurricane, etc., and many more areas that we can’t count. The fact that remote sensing works are based upon images, is highly close to image processing. On the basis of the studies, there are signal and image processing, categorization techniques, comparisons, and simulations to get results. It should be noted that under the name of remote sensing, only Earth surveys with satellites should not be understood. In this point, with the additional concept of Earth Observation included with it, remote sensing can include other sensing methods. For example, medical imaging and diagnosis are also remote sensing. Augmented reality studies are also related to remote sensing.

This field and diversity of information also portray the diversity of computers and data within the scope of remote sensing. With the integration of location information to data systems, remote sensing studies gained importance, much more comprehensive and useful multidisciplinary work has started to be done.

Remote Sensing Science is a new subject that is developed on the basis of space and earth science, environmental, geomatics and mapping science, electronic and electrical science, computer science and used in geological and mining science, medicine etc. Remote sensing technology advances compound and applied talents with strong practical engineering and research abilities, as well as basic theory, basic knowledge, and basic skills in remote sensing science and technology, and the ability to engage in remote sensing technology research, development, configuration, instruction, production, and management.

Every computer engineer who works with any topic must know its fundamental concepts of it. To work and develop remote sensing programs, developers must know the basic theory and basic skills of remote sensing technology. Maybe get basic training or scientific research in geomatics, mathematics, physics, electronics, and telecommunication, also in this scope digital image processing, digital signal processing, and electromagnetic field theory.

The main purpose of remote sensing technology is geographic information, spatial positioning, and mapping.
systems. In this scope, the principle of satellite communication, signal and system processing, microwave and microwave remote technology, the principle of GPS, radar interference measurement, pattern recognition, and artificial intelligence.

The multidisciplinary science name that is possible to use between remote sensing and computer science is geographical information science. Geographical information science involves the aspects of using and analysis of databases, digital maps, models, and mobile implications, as well as spatial and navigation integration tools. In the background in geographical information science, there is computer science with programming languages and database systems. GIS applications include geographical information systems, remote sensing, spatial modeling and mapping, image processing, and computer graphics. These rely on an algorithm, data and database integration, hardware design, and software and system development.

III. REMOTE SENSING SYSTEMS

Remote Sensing has a wide range of application areas with a strong discipline. Usually, with the concept of remote sensing, it is understood as remote sensing with satellites. Last ten years we have entered an era of data. With the rapid development of remote sensing science and technology, our ability to obtain remote sensing data has been improved to an unprecedented level. Remote sensing data clearly shows the characteristics of Big Data. Even though in satellites raster data is obtained, in database file systems are developing at a fast unexpected rate. Considering the data structures, new data centers designed to store, manage and analyze huge data sets increase dramatically every day.

Compared to the uncontrolled data, even though the remote sensing systems’ dataspace of development is known, the dimensions of it have shaped a worry for the future. Big data insight, makes sense to dimension and difficult management. Usage of raster and vector data in remote sensing, compared to demographic databases, shapes a faster developing, more complex management and analysis.

For whichever data mass to be considered as “big data” it needs to have some 5V features; Volume, Velocity, Variety, Value, Veracity [6]. If we look at it more deeply;

Volume: the size of the area that data occupies. It is directly proportional, and as it was mentioned in structures containing satellite images reach size such as gigabytes, terabytes, petabytes.

Velocity: data speed and the source that data was made is connected. Satellites produce fast and organized data.

Variety: Data’s diversity is related to data’s production sources. Data that are produced on a basis are kept with XML (GML) format and vector structure.

Veracity: Accuracy of the data is related to analyzing and being able to obtain meaningful outcomes. In the satellite data whether the data is convenient depends on a series of criteria. In this sense, one of the primary building blocks of remote sensing is image processing.

Value: With a connection to the previous feature, it is the data’s value. The main thing is not the ability to store the data but to manage it, the ability to analyze it and evaluate it efficiently.

In remote sensing science about the topic of “big data” is still being researched and developed. With the development of data processing, the concepts that entered our life are deep learning after the machine learning concepts. Both ways of teaching can be applied with remote sensing technologies. Nowadays, developed object recognition, object detection, and categorization algorithms and satellite images can be processed with high accuracy.

Data is valuable as long as it is processed and interpreted. Depending on the features we have mentioned above, the size of the data adds efficiency to the system when it can be understood, learned, and improved. Collective development of systems; satellite, satellite instruments, data structure and organization, database systems, regression, and correlation analysis software; is possible when they complete each other.

Before data and database were mentioned, the first thing that came to mind was demographic data-containing systems, with the satellite's data creation of hegemony, and with definition and inclusion of spatial data in information systems, the scope of data has expanded. Datacenter is transferred to “spatial data”. The storing of spatial data started in 1950s but became effectively used in the 2000s [7-9]. With the usage of spatial data, Geographic information science (GIS) started to be used [10]. With the speed of technological development and geographical data, usage has become widespread. Especially with mobile applications, people of all ages and at all levels of development have access to data that makes life easier. In this direction, the types of systems that can be combined have increased and the area of interoperability has expanded. In today’s systems, interoperability principles have an important place. Special standards were placed, designed and interoperability principles were specified [11, 12]. With the addition of the dimension of time to data, data structures can accommodate all types of data and work jointly.

Even though the integration between systems is still connected to data, it didn’t only focus on the database. With the implementation of new, faster, and more practical software languages, the structures in which we can process remote sensing data have increased and gained speed. The detailed alphabetical list of structures developed and being developed by computer engineering for remote sensing science is explained in detail on the GRSS-IEEE page under the title of “Open-Source Software related to Geoscience and Remote Sensing” [13].

In parallel with the developing software world, open-source structures have also taken their place in this race. Used open-source structures majorly contributed to remote sensing applications. For example, in the outcomes of image processing works, specific image filters can be improved by processing based and can be presented for the usage of large masses. Likewise, when the categorization algorithm software is open source, it can be added, and it
can be improved by different developers for reusing. The open-source approach is very important in such rapidly developing cases. Features of open-source software such as flexibility, performance, security, compliance with open standards, and writing quality determine the quality and percentage of use. During remote sensing operations, software, product, processing software, map integration, and open-source software that can process statistical data are waiting to be used and developed.

IV. CONCLUSION

The aim of this study is to examine the intertwined disciplines and the interoperability points of Remote Sensing Science and Computer Science. Remotely sensed data, along with their attribute properties, can have information about areas that our eyes cannot see, and it can be used to carry out studies to understand and comprehend. The basis of all functions is the entry, storage, processing, and result output of remotely sensed location-based data into the system. In this process, the software developed and used, the knowledge and abilities to be acquired were determined, and the common points combining these two sciences were examined.

REFERENCES

Abstract – Ensuring democratic participation is only about basing the legitimacy of political governance on the people and convincing the people. In this context, one of the most basic indicators of the sovereignty belonging to the people or citizens in a democratic society is the development of mechanisms that oblige the elected or appointed officials in public institutions and organizations to be transparent and accountable directly or indirectly to the public. Transparency and accountability are concepts that interact with each other. Namely, effective and well-functioning accountability processes in order to ensure transparency in a democratic government: In order for the accountability processes to work effectively and well, open and transparent public policies are needed.

From this point of view, “What is the importance of a transparent and accountable government approach?” In this study, in which we seek an answer to the question, the definition and explanations of the concepts of “transparency” and “accountability” and their effects on democratic life will be explained.

Keywords – Democracy, Transparency, Accountability, Government Participation.

I. INTRODUCTION

In order to carry out a democratic government, elections at certain times are not enough. However, government actors need to be held accountable to their own colleagues, elected officials, other public institutions, public service beneficiaries, taxpayers and a wide range of people, such as the public [1].

It is a well-known fact that as democratic understanding and performance improves; society demands more accountability from the state. Because accountability is actually a requirement of democratic control. It is not only a sign of quality, but also an indispensable condition of democratic governance [2].

In order to ensure the responsibility of accountability to the public in a democratic government, the principle of transparency in the activities and operations of each stage and unit of government must be valid. In this context, the principles of transparency and accountability are concepts that are often used together and interact closely with each other. These two concepts are basically; it refers to the tendency of democratic governments to share information about their plans and actions and to make the necessary statements. Transparency and accountability, two important principles of the governance approach; it can take place in a system where free and fair elections are held, the legislature is representative and observant, and there is an independent judiciary. In such a system, governments, companies and organizations are obliged to ensure that their activities are understandable and predictable by third parties [3].

Transparency and Accountability are interconnected concepts, and the relationship between them is reciprocal. We can’t say that without one, the other means too much [4]. It is seen that the effective use of both principles depends on each other. However, both transparency and accountability are not the only conditions that have an impact on each other. There are different conditions that are effective in the existence of both concepts. It is possible to refer to these two concepts as “matching parts” [5].

II. THE CONCEPT OF TRANSPARENCY

While the definition of transparency is made, it is also seen that the concept is discussed in terms of transparency of processes, transparency of information and an institutional feature in practice. With the transparency of the processes, an understanding is expressed that the processes are open and reported. It is meant to present the information reported from the transparency of the information in an accessible and meaningful way. Transparency as an institutional feature is the adoption of transparency by democratic governments in terms of value [6]. Transparency; standardized processes for making and modifying regulations, consultation, understandable language; it refers to a wide range of applications, including publishing, collecting as law, and other rule-making methods for finding and understanding easily, predictable and appropriate application and implementation processes [7].

There are four different mechanisms for the implementation of transparency in public services. Functioning of each of these mechanisms, which are categorized as voice, choice, representation and information, in terms of ensuring transparency in public services is different from each other. Although it is emphasized that there is not the only ideal mechanism that suits every service or institution, it is possible to apply different mechanisms at the same time. Of the
mechanisms under consideration, voice refers to the voice of citizens [8].

It is true that there are four natures of transparency. Firstly, information transparency should be ensured. Thus, the actors of the political decision-making mechanism will have access to all kinds of information about the decisions taken and related to them. The second feature of transparency is participatory transparency. Participation means that citizens take part in political decisions through fair representation or direct participation. Thirdly, it is necessary to ensure transparency regarding liability. In this way, public officials can be held accountable for their actions and decisions both in the judicial system and in the public opinion. Fourthly and finally, the transparency and independence of the judicial system should be guaranteed. Thus, the possibility of raising doubts about the correctness of the judicial procedures of the decisions made by the courts will be eliminated, and if there is doubt, it will be possible to apply to the judiciary again [9].

On the other hand, we can divide transparency into two types: opaque and clear transparency. It is possible to refer to opaque transparency as ambiguous and non-obvious transparency. As the rhetoric of transparency becomes increasingly involved in public administration, those who oppose this principle prefer opaque transparency in practice. In opaque transparency, information about the decision-making and implementation processes of institutions is not in a way that reflects the truth. Clear transparency, in contrast to opaque transparency, describes what is intended to be expressed with the word transparency. The fact that decisions, actions and performance-oriented information taken in institutions with the prior determination of powers and responsibilities are presented in a fair and accessible manner are indicators of clear transparency. Thanks to the adoption of clear transparency, beneficiaries of the services offered by the institution, participants of these services and producers of various ideas have the opportunity to follow corporate strategies [10].

III. THE CONCEPT OF ACCOUNTABILITY

Accountability is valued as the corresponding relationship and interaction between the accountability and the account-holders, rather than the meaning of unilaterally providing information or disclosure. In this relationship, it is emphasized that not only the behaviours that government actors need to perform should be emphasized, but also that there should be mechanisms to ensure that government actors can be questioned after their behaviour [11].

The concept of accountability is also a type of responsibility. We can define three types of liability, including accountability. The first of these types of responsibility is defined as ‘capacity’, which is the skill and authority necessary for the officer to fulfil his duty, while the other form of responsibility appears as “obligation”, which causes the consequences of the actions performed by the officer to lead to sanctions. Another of these responsibilities, “accountability”, is stated as the necessity for officials to explain and inform internal or external authorities about their performance in the transactions they perform [12].

The concept of accountability means the obligation to make statements against the persons or groups that give them these responsibilities in order to fulfil the responsibilities. Therefore, accountability is a tool used to achieve anything and ensure the fulfillment of responsibilities, rather than being the goal in itself [13].

When accountability is functionally considered, three main features come to the fore. Firstly, accountability has an external feature in terms of accountability and accountability to another person or authority other than the person or institution itself. Secondly, accountability involves social interaction and reciprocity, as it requires making statements and accepting questioning. Finally, it is the acceptance of the existence of the questioning rights of the questioner within the relationship of accountability [14].

It considers accountability in three dimensions: oversight, justification and sanction. In this sense, actors who use public power should continue their actions in a manner that is open to surveillance and in accordance with transparency, justify these actions by justifying them, and be subject to sanctions for their actions. The ability of government actors to justify their actions is also referred to as responsiveness. It is emphasized that the implementation of accountability taking into account these three dimensions will prevent the abuse of public power [15].

It could be emphasized that the accountability relationship basically consists of three phases. The first of these is the information phase. At this phase, those who will be held accountable must inform the necessary people and authorities about the activities they perform and the decisions they make. The second phase is the negotiation phase. At this phase, those who will be held accountable can ask them questions about the adequacy of the activities carried out by the responsible for accountability, request additional information other than the information they provide and make a judgment within the framework of the information they obtain. This phase is based on reciprocal interaction between both parties. The final phase is the conclusion or sanction phase. As a result of all these discussions, a definitive judgment emerges [16].

At the heart of the relationship between the accountors and account-holders lies the principal/agent theory. This theory is mainly about the delegate of power. People need others in all areas as a necessity of living together in order to continue their lives in their daily lives. In the event that it is not possible for them to meet unlimited human needs individually, people assign other people or institutions to perform operations on their behalf in order to fulfill their needs. More precisely, as a justification for the birth of the principal/agent theory, the principal ones give authority to the agent. However, for the theory to work, control mechanisms are needed to ensure that the agents acting in place of the originals perform their duties in the interests of the principal ones and prevent public officials serving on behalf of citizens from abusing the power provided by the state. Therefore, accountability implies more than the exchange of questioning and answering, and the pursuit of transparency. Agents should not only be called to account;
they should also be held to account. Accountability is incomplete without an effective correction. Where institutions or officials are found to be fault, there must be ways to implement certain remedies by punishing criminals and compensating victims [17]. In this sense, accountability includes all kinds of inquiries, explanations and response activities related to the activities of public officials who perform their duties within the framework of the principal/agent relationship [18].

IV. EFFECT OF TRANSPARENCY AND ACCOUNTABILITY

In terms of transparency and accountability, it can be observed very differently from those who benefit from global regulations. When the effects of these two concepts created by democratic governments are examined, common or similar aspects stand out due to the interaction of the concepts with each other. As a matter of fact, since transparency and accountability often come together, it is very difficult to find a system where one principle is applied and the other is not, and the effects of the two concepts are independently observed. However, the effects of both concepts combine to create institutions that act effectively and responsively and to ensure sustainable development in the economic and social sphere [19]. The effectiveness of the accountability relationship, two-way transparency in relationships in terms of accountability and accountability; requires an independent and mutual sense of trust, openness and a rational understanding [20]. On the other hand, excessive transparency and accountability can lead to making non-optimal and inefficient decisions instead of improving performance. In cases where resources are inadequate and low, excessive accountability can result in inefficient distribution of these resources [21].

V. THE RELATIONSHIP BETWEEN THE CONCEPT OF TRANSPARENCY AND ACCOUNTABILITY

There is a prevailing opinion that responsiveness alone is not sufficient without resulting in any sanction. Because it is not easy to ensure that institutions and individuals are accountable without a deterrent or encouraging force. Accountability alone is called the “soft face of accountability”, while with the inclusion of the possibility of sanctions, it is called the “hard face of accountability”. This discussion will be limited to distinguishing between the two basic dimensions of accountability. Answerability can be called “soft face”, while “hard face” includes responsiveness plus the possibility of sanctions. Table 1 and 2 are organised around this distinction. They show how the presence or absence of certain enterprise capacities relates to opaque or clear transparency on the one hand and either hard or soft accountability on the other. Three kinds of institutional capacity are depicted in terms of varying shades of grey: the dissemination of information and access to it, answerability and the power to sanction/compensate. The relationship between transparency and accountability is illustrated by these differences in institutional capacity [22].

<table>
<thead>
<tr>
<th>Transparency</th>
<th>Accountability</th>
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<tbody>
<tr>
<td>Dissemination and access to information</td>
<td>Institutional “answerability”</td>
</tr>
<tr>
<td>Sanctions, compensation and/or remediation</td>
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<td>Dissemination and access to information</td>
<td>Institutional “answerability”</td>
</tr>
<tr>
<td>Sanctions, compensation and/or remediation</td>
<td></td>
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</tbody>
</table>

Ensuring access to information in a democratic government shows that this government is transparent, regardless of whether it is opaque or clear. However, access to information alone is not sufficient to ensure accountability. As can be seen from the tables, there are different transparency and accountability dimensions, and the elements contained and required by each of them may differ. These elements intersect in some cases, but in some cases diverge from each other [23].

According to another opinion [24] describing the relationship between transparency and accountability, being accountable means having to justify actions and decisions to a person or organization. Transparency expresses the idea that information about the actions of an individual or organization can be seen from the outside. The strength of these two concepts – accountability and transparency – is revealed when they come together. Enabling one does not necessarily mean enabling the other. Table 3 presents a model of open that combines hard and soft accountability distinction with opaque and clear notions of transparency. The colour scheme shows the relative probability (from green to red) of the research practices falling in each cell will achieve the goals of “open data” policy initiatives, namely broad accessibility and usability of data [25].

The element of sanctions contained in hard accountability has a different effect in cases where there is clear and opaque transparency. The intersection of clear transparency and hard accountability means sharing data with all the necessary features. At the intersection of opaque transparency and hard accountability, there is a sharing of data to avoid facing sanctions. But, there are no explanations to facilitate the understanding of these data. At this phase, where there is no transparency and hard accountability continues, the loss of resources as a result of sanctions is encountered. While there are accessible data at the intersection of soft accountability and clear transparency, these data are not used in the name of responsiveness. In the absence of opaque transparency or
any transparency dimension while soft accountability is found, the result is the same as a lack of disclosure and accountability with non-public data. In the absence of any accountability seen in the last line, the existence of transparency is inadequate, regardless of what kind. Because there is no accountability, shared data is not used by any user group. It is seen that sanction-based accountability and clear transparency must be found in order to ensure effective flow of information from this relationship between transparency and accountability. In this context, the transparency concept clearly implies accessibility. If something is not accessible, it cannot be transparent. But providing access does not itself make something transparent. Achieving clear transparency can be difficult. What appears to be clearly transparent for one community may be totally opaque to another [26].

TABLE III
THE RELATIONSHIP BETWEEN ACCOUNTABILITY AND TRANSPARENCY IN DIFFERENT OPEN DATA SCENARIOS

<table>
<thead>
<tr>
<th>TRANSPARENCY</th>
<th>Clear</th>
<th>Opaque</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard</td>
<td>Data lifecycle management meeting all requirements</td>
<td>Losing funding due to data management</td>
<td></td>
</tr>
<tr>
<td>Soft</td>
<td>Making data available, being answerable</td>
<td>Data may or may not be publicly available, minimal description and no responsiveness</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>Public archiving with no known user community</td>
<td>Data gulag</td>
<td></td>
</tr>
</tbody>
</table>

VI. CONCLUSION

Depending on the strength of democracy, the effects of secrecy in democratic government on social life and also on the government itself have become more questionable. Likewise, the fact that the people has a say in the government and controls the government is among the basic qualities of democracy. In addition, democracy will remain a procedure only on paper if those who hold power are not held accountable for their actions, omissions and expenditures in their decisions and policies. One of the main qualities of democracy is that it maintains the sensitivity of the state to the priorities of citizens. This sensitivity is simply not in the elections. It should also be observed between selections. In this sense, it is necessary to go beyond the concept of formal democracy. In this process, the continuous participation of the people in the elections should be ensured and the methods of participation in the decisions taken should be increased. Therefore, in a democratic government, effective and well-functioning accountability processes are needed to ensure transparency. In addition to this, open and transparent public policies are required for the effective and well-functioning of accountability processes.

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Key Steps and Parameters for Digital Transformation in Big Telco Organizations

Dragan Stankovski¹, Dimitar Radev²

Abstract — Nowadays the big telecommunication companies in order to survive and keep more customers in their business must be innovative, flexible, and must support a huge number of portfolios and services so they can respond to the very aggressive and dynamic market. Most of them are still using the old fashion way of working and this is directly impacting the readiness and the speed of the new content development. Here is the reason why most of the telcos start to transform their way of working and move more into the agile model with only one reason to develop, integrate and deliver continuously with better quality and less technical depth. The digital transformation can be also a dangerous approach if the flow and recommendations are not followed. This paper aims to provide a clear view, approach, and suggestions that will reduce the stakes and ensure a smooth transition and transformation.

Keywords – digital transformation, telecommunication, agile, agile transformation, project initiation, project execution.

I. INTRODUCTION

When the big telco corporation claim for transformation and moves mostly from the waterfall model of working do the agile there are huge challenges that sometimes can act as big rocks and lead to project deviation or in worse case project jeopardize or failure. The digital transformation itself it's not an easy process because except for the technical part and complexity of the methodologist there is also one more key factor related to the people's behavior (culture) and unfortunately in most cases fear and rejection to accept the new way of doing. Challenges and main recommendations for the companies operating in the field of telecommunication who are seeking to transform a way of working into a more efficient and stable part should be provided in the next few chapters of this paper. The focus is on the organization level and the steps that can be used as a major checklist to avoid and ensure smooth transition and success of the development of their projects.

¹ Dragan Stankovski is with the University of Telecommunications and Post, Sofia, 1 Acad. St. Mladenov Str, Sofia 1700, Bulgaria, e-mail: draganstankovski@gmail.com
² Dimitar Radev is with the University of Telecommunications and Post, Sofia, 1 Acad. St. Mladenov Str, Sofia 1700, Bulgaria, E-mail: dradev@abv.bg

II. NEEDS AND KEYS OF DIGITAL TRANSFORMATION IN BIG TELCO ORGANIZATIONS

Most of the companies are providing services in the field of digital transformation are establishing good industry practices, rich experience and technology, and tools to enable successful transformation. Unfortunately, not all of them have the big experience to transform both front-end and back-end development structures and processes. As pointed above, this paper aims to present all steps and benefits to close the whole 360 degree of process and key elements of transformations:

− Robust solution approach and architectural principal
   Usually, the first proposed approach is based on mature product capabilities and strong control mechanisms to ensure various installations of the same solution adhere to the basic design principle. Very important steps here are to provide 2 key elements:
   • Design Authority – best practices and strong solution architects to review and approve any solution or tailoring needed on top of the product solution ensuring.
   • Adaptation to change – Organization and the process around it needs to be adjusted to adapt to a new way of working.

− Strict Change Management.
   This part is very critical because, in the mode of development, most of the requirements are changed and could jeopardize the project execution.

− Right Skills and Experience – serious need is to select the right team with the appropriate skills and experience to ensure this program is successful.

− Organization Structure based on the ground experience and successful accomplishment of complex projects. The Team structure should always be a mix of BU (Business Unite) focused team and Global team members to ensure the team focuses on the big picture and at the same time executes control and power at the BU level [1].

− Program Governance for complex management as various stakeholders need to move from the regular method of work to a new way of work (From Waterfall model to Agile).

− Business Process Optimization and the Legacy process should be optimized with a new work method. Several of these activities should have more optimized methods and this will enable and improve efficiency.
Business Readiness - Business Readiness is critical for any transformation program to ensure success. Business readiness is a very comprehensive area that Telcos need to work in from the beginning of the program (and not from the end of the program). This includes several activities such as:

- Onboarding of business stakeholders
- Availability of business stakeholders in decision making – solution/process change
- BAU Business milestones dependencies resolution
- Skill development/training.

Development Methodology

The modern approach is to follow the established DevOps process in the complete lifecycle. It begins from the project’s initiation until the software delivery to the onsite environment.

- The most important part is to use a set of tools to enable efficient quality work and validation. This helps to avoid manual mistakes including CI/CD (Continuous Integration/Continuous Development), and regular automated testing, along with a very good control mechanism [2].

III. DISCOVERY AND DELIVERY PHASES AND KEYS FOR SUCCESSFUL PROJECT EXECUTION

All projects can be divided into 2 basic phases, one to discover what needs to be done and describe appropriately, and the second one to deliver the written and place into production Fig. 1.

1. Discovery

The very important part and the first phase of any project execution consists of the following phases:

1.1 Preparation and Planning

The main purpose of the Preparation and Planning phase is to ensure the project is ready for the next phases. This phase will include:

- Understanding the scope of the project – Understand the specifics of the SOW (Scope/Statement of Work)
- Learn about “Business Units” pain points, business value, and priorities; build an agenda for the Project Inception step based on Telco priorities
- Team ramp up and training – Ensure that the required team is on board for performing the subsequent activities. Train the team on the suggested architecture, high level proposed solution, and delivery strategy
- Stakeholder identification from both sides – Set initial communication plan
- High-Level Timeline – Set the first version of the project plan as a baseline

1.2. Verification

Its main purpose is to prioritize the content with the Initiatives/EPICs [3] and break them down into lower-level units (Stories) to establish the basis for the development Fig 2.

![Fig. 2. Basic structure and hierarchy of scope and content](image)

During this phase, the main gaps are listed and initial discussions take place so that actions can be proposed to enable closure. The hardware discussions are also a major part of this phase including all deliveries and delays.

The major part and the most important point of this paper is to present the activities and methodologies that need to be followed. In this case, the Agile methodology is implemented and will include the following activities:

1.3. Backlog Definition, Prioritization, and Refinements

During this phase, both sides will verify the correctness of the Initiatives/EPICs and business processes, agree on their priorities and break them down into Stories. The focus initially is placed on defining the common Stories of the and used later on by all Business Units [4]. Focusing on the common Stories is a crucial part of the project’s success (and ensuring it is on time and within budget).

Activities that must be performed in this phase are listed below:

1. Validate High-Level Solution and Detailed Architecture
2. Define the Initiatives/EPICs solutions based on Telco requirements
3. Define interface specifications with interfacing applications
4. Business Data Gathering approach for Product offers and Other Business parameters
5. Define Testing approach
6. Continuously feed the Construct phase with user stories according to the maturity of the corresponding content and EPICs.

The most important moment and very interesting part or questions from the Telcos is to understand what are the results and after all those interactions what should be the outputs. In this case, all activities mentioned above will provide strong document deliverables such as Initiatives/EPICs solution document, Non-functional solution document, Updated, and final list of Stories list with additional backlog items, Interface Detailed Design (IDD) documents, documents related to security manner and clear 360 view of the project design and architecture – called Blueprint.

2. Execution

Usually, when the project starts, it is always recommended to initiate discussions on the technical architecture design at the start of the project. With this purpose, there will always be a design and a Detailed Architecture Design document that will summarize the technical architecture and infrastructure requirements of the proposed solution, including the necessary components (hardware and software) required for the solution implementation within the Telco Business Units’ overall infrastructure. The document will cover mainly the topics for Physical Hardware inventory, Virtual Machine detailed deployment, Third-party software list, Storage sizing, Datacenter connectivity, High-level backup strategy, etc.

The flow below is the recommended sequence: Data Migration environments, System Integration Test (SIT) environment, User Acceptance Test (UAT) environment, Non-Functional Test (NFT) environment (as per project needs), Production and Disaster Recovery (DR) environments [5].

2.1. Construct

The overall development should be divided into Project Increments (PIs) of eight weeks each, which will include two iterations (Sprints) of three weeks each, followed by two weeks for defect fixing (waterfall model), improvements, and preparations for the next PI Fig. 3. For each PI, the Lead Product Owner (PO), together with the other POs, should define the scope of the PI and which EPICs and Stories must be tested when it ends. The EPICs consist of Stories and Tasks that together represent an end-to-end testable flow. The Stories that make up the EPICs are developed, tested, and demonstrated to the POs during alliterations, by the Scrum teams.

2.2. PI Scope Prior - The exact content for each PI could be finalized in the Scoping/Solution Validation phase. Following are the guidelines for deciding the content of the PI:

- The best practice and the most important is to fit all core and common Epics, Stories and related tasks must be covered first in PI1.
- Leftover core/common content plus all complex localization or customization must be covered in PI2, 3, etc. This will allow more time for complex content to develop and test along with the core layer code.
- Leftover and late changes should be part of PI3, which is the last PI in the Proposed plan
- Late changes coming from post scope closure for all three PIs need to be scheduled separately and potentially late changes must be planned as a late drop in the lifecycle.

3. System Integration Testing (SIT) and User Acceptance Testing (UAT)

3.1. The main purpose of System Integration Testing (SIT) is to ensure that the integration points between System components to external systems work according to the design.

Usually are existing two mechanisms for integrating:

- Point-to-Point Testing: This aims to validate that the integration between the source and target of a given interface is working from a technical (message/data communication flow) and functional (message/data received and accepted) perspective.
- End-to-end Integration Testing: This aims to ensure that all related systems maintain data integrity and can operate in coordination with each other in the integrated test environment.

The Final results are captured in a couple of Deliverables and artifacts expected at the SIT stage like Test Scenarios, Test Calendar, Test Cases, Test Results (including defects), Test Summary Report, Progress Reports

3.2. User Acceptance Testing (UAT)

The objective of User Acceptance Testing (UAT) is to verify that the business functionality is working end-to-end in a fully integrated environment. The UAT should be divided into two sets of tests:

- Test on new data – The purpose of these tests is to verify that the EPICs are working as per the design on newly created data.
- Test on Migrated data – The purpose of these tests is to verify that the EPICs are working as per the design on migrated data.

Deliverables and artifacts expected at the UAT stage: Test Scenarios, Test Calendar, Test Cases, Defects, Test Result (including defects), Test Summary Report, Progress Reports [6].
4. Finalization Stages

To close the full cycle and technical processes will be shared as high-level descriptions in this paper. After the execution and planning and passed testing the very next step is to go to production, so this part is related to the “Deployment” and in this phase, the software components are moved to the live system by installation and sanity checks. The next level is “Support” which starts from the first rollout, the system will start the post-production support period. The start date can vary per Business Unit, based on the rollout plan. The support usually is divided into two sub-periods: Stabilization (This will start immediately after the first Business Unit rollout and usually will end 60 days after the last rollout) and Ongoing Support (Starting after the last Business Unit rollout and it is an agreement between Telcos and different vendors, also can be an inside process too). Such approach and development usually are used in many modern applications, varieties of OTT extras and digital services, and products. Most of them are part of our daily life and challenge to keep the customer in this ocean of services and new features to be always on the top of the market [7].

IV. CONCLUSION

The chapters above present the full lifecycle of one digital transformation in a big Telco corporation. The major problems that all of them are facing and the suggestion that should be the key points to not delay or crush this process are proposed as a summary in table 1 below. For each step, the most important criteria are mapped as entry and exit criteria per each phase. Note that some of the deployment phases are bypassed due to the individuality of the telcos and legacy and they need to be separate and mostly project-specific investigation planned.

The most important part and the benefits of this paper are possibilities to be used as a checkpoint for the main activities during the transformation.

ACKNOWLEDGEMENT

The information in this paper and the numbers of the suggested methods, frames, and activities are based on the real project execution developed in the United States of America as a Greenfield project. The project was developed by a group of 80 participants induration of two years and was successfully launched without any rollback to production. The percentage and rates of the suggested testing part are connected with the needs of the telcos to launch the product on the markets, they can be modified, changed, and used in the other business units up to their needs and criticality.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Entry Criteria</th>
<th>Exit Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiation (Starts with the project negotiation)</td>
<td>Deep Dive Engagement (Normalization) ended</td>
<td>- Agreed Project Blueprint - Agreed list of high-level Initiatives and EPICs - High-Level project plan</td>
</tr>
<tr>
<td>Verification (Starts at Official Project Start)</td>
<td>- Business Value Analysis completed - Third-party hardware procurement started - High-Level project plan agreed</td>
<td>Backlog Definition, Prioritization, and Refinement completed with the following deliverable signoff from all sides.</td>
</tr>
<tr>
<td>Execution – Agile Construct</td>
<td>Mature Epics and User Stories exist in the backlog (At least 10% of the entire scope)</td>
<td>Testing completed as follows: - 100% Test Case execution &gt;= 95% Test Case pass rate. - No critical defects - Up to 10% High defects for which a clear remediation plan is defined for the next Test execution or. - Medium and Low – Up to 20% Medium and/or Low defects</td>
</tr>
<tr>
<td>Deployment – First Rollout, the start of stabilization</td>
<td>All previous test phases meet exit criteria. The continuity plan is ready, and the Tests are completed.</td>
<td>Migration is completed on time. Sanity Tests were completed successfully with no critical and high defects. Mutual agreement for Go Live.</td>
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REFERENCES


Laboratory System for Testing Photovoltaic Cells and Panels - Principle and Algorithms

Dzhihan Menseidov

Abstract – The photovoltaic cell testing system allows you to reproduce the behavior and dynamic characteristics of a system or part of it in real time. This quality makes the testing system extremely useful for controller validation and is widely used in photovoltaic systems (PVS). This study presents in principle the development of a test system to emulate the behavior of PVS, which includes a photovoltaic panel (PVP) connected in series. The implemented emulator is offered as a platform for validation of control systems. In it, the experimental stage is performed on a single controller connected to PVS, allowing emulation of different operating conditions. The controller generates settling times of less than 3 s.

Keywords – Photovoltaic, Test systems, Cell.

I. INTRODUCTION

Photovoltaic cells have enjoyed considerable interest over the last decade and promise a bleak future as they offer the potential for cheap renewable energy. By direct photo-electronic conversion and the presence of abundant sunlight. Solar cells are thin, light and flexible, which makes them easy to implement and used for various purposes. Rapid progress has been made in extending service life and improving power conversion efficiency (PCE), reaching 10% with relatively small scale devices [1,2]. Device efficiency has increased systematically in recent decades as a result of advances in understanding the photoconversion mechanism that instructs device design and material synthesis. The photoconversion mechanism can be divided into five main components: the component shown in Figure 1:

- light absorption,
- exciton transport,
- exciton dissociation,
- charge transport
- charge retrieval.

The latter two are often covered by a single fee collection term [3,4,5].

A. Light absorption

The photoactive component of photovoltaic devices consists of conjugated carbon-based materials. The unifying aspect together with the low dielectric constant leads to a different mechanism for the conversion of photo into inorganic solar cells. Free charge carriers are created directly in solar cells, connected electron-hole pairs. The exciton growth is directly related to the number of photons absorbed. In this process, the excitons remain bound in electronic materials.[5]

B. Exciton transport

Exciton transport is controlled by diffusion processes. It is aimed at areas with high concentrations of excitons. If the exciton does not separate within its cycle, the electron-hole pair simply recombines and is lost.[6]

C. Exciton dissociation

The minimum binding energy of the exciton is approximately 0.25 e –1 eV, it is required for the exciton dissociation. Therefore, heat and electricity are insufficient under room operating conditions for exciton dissociation and the chemical potential difference is used instead. Impurities cause dissociation, but this process often leads to the fact that the captured charges instead of free charge carriers have a destructive effect on the operation of the device. This condition is traditionally known in charge transfer, but also occurs as a geminate pair, a related radical ion pair. The Coulomb interaction remains significant until the electron-hole separation distance exceeds the capture radius.

D. Charge transport

Under the influence of the electric field Coulomb interaction, energy disorder and morphology, the charge carriers are transported through the associated transport
networks through holes and the electrons jump through the p-type and n-type material, respectively. Electrons and holes can recombine and be lost or jump to the electrodes, where they can be extracted to produce a photocurrent.[7,8]

II. JUSTIFICATION OF THE TEST SYSTEM MODEL

To develop the device for testing a photovoltaic panel, the block diagram shown in fig. 2.

![Block diagram of the PV panel evaluation system](image)

The scheme contains a photovoltaic panel (PV), which is the subject of the test. Next to the panel is a pyranometer (PM) to read the radiation received from the sun during the test. The pyranometer measures the shortwave light radiation reaching the Earth's surface, measured in watts, per meter per square meter (W/m²). On the back of the PV is a thermal sensor that measures the temperature of the panel. From the data obtained from the pyranometer and the thermosensor, information is obtained about the conditions in which the photovoltaic panel operates. The signals from PM and TS as well as the parameters from PV are fed to the analog-to-digital converter (ADC). The processed ADC signal is fed to the central processing unit (CPU) for analysis and evaluation. In the absence of data from the sensors or PV, the CNC warns of a lack of connection or damage by means of an alarm unit (AB). The data obtained after processing in the CNC are visually presented through an output display. [8,9]

To compare the qualitative differences in the electrical characteristics of PV panels, the following main evaluation parameters are most often used [10]:

- Open-circuit voltage (Voc)
- Short circuit current (Isc)
- Maximum cell power (Pmax)
- Efficiency (η)

III. BASIC PROCEDURES FOR THE FUNCTIONING OF MANAGEMENT

In Fig. 3, the algorithm for realization of the program, which will manage the controller according to the requested task, is shown.

![Main algorithm of the program](image)

Description of the principle of operation of the individual blocks of the algorithm
Initialization
Initialization is required to reset the parameters and enter the necessary constants and parameters of the job.

Battery level subroutine
Check the condition of the battery. If there is a charge above or equal to 15% of its capacity, the test continues. If the charge level is below 15%, a warning is given via the battery indicator. When the charge level reaches 5%, the test is automatically terminated, algorithm in Fig.4.

Fig.4. Algorithm for monitoring the battery level

- Level of solar radiation
  In the presence of solar radiation above 700W / m2 the test can continue. At radiation levels below the set minimum, the program goes into standby mode.[11]

- Data entry subroutine
  For the proper functioning of the system it is necessary to enter the expected limit of the nominal power of the system. Below the program displays a message on the LCD display for entering Pmppmax after accepting the upper limit. A message for Pmppmin is displayed after entering the lower limit, the program checks the condition Pmppmax> Pmppmin, if the condition is met, the test should be continued. If the condition is not met, an error message will be displayed and the cycle will be repeated. The algorithm of the subroutine is presented in Fig.2.5.[12]

- Check for connections
  In the absence of a connection between the analog-to-digital converter and the photovoltaic panel, the pyranometer and the thermosensor, the light indication of the alarm unit is activated.

- Measurement of radiation from the pyranometer
  Reading the data from the pyranometer after processing in the ADC and recording them as Sv.

- Temperature reading from TC
  The data from the thermal sensor received at the analog inputs of the processor are read and recorded in the parameter Tmod.

- Subroutine for calculation of derived parameters.
  In order to prepare a comparable characteristic of the photovoltaic panel, it is necessary to unify its working conditions. Based on point 1.1.6. Standard operating conditions of photovoltaics must harmonize the parameters measured by the test system with the standard operating conditions, namely - solar radiation 1000W / m2 and ambient temperature 25°C. The data that will be standardized are the output current and power of the panel at 1000W / m2 and 25°C and the output voltage at 25°C. In Fig.2.6. the algorithm with the sequence of calculation of the additional characteristics of the photovoltaic panel is presented. The algorithm consists of five blocks, four of which are for calculating the characteristics and one block for checking whether the data is recorded.

IV. CONCLUSION

The following conclusions can be drawn from this review:
Regardless of the type of solar cells, there is a need for a system that assesses the quality of solar panels. Shading is one of the major problems facing photovoltaic plants. Having a system for assessing the parameters of the panels would help to quickly detect damage to them and their timely replacement.
It is imperative to create systems for evaluating photovoltaic panels using suitable parameters for measurement. It is necessary to use specialized sensors to evaluate the parameters of photovoltaic panels to increase the accuracy and speed of the system.

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Polyvinylidene Fluoride Application in Electrospinning – Overview

Dzhihan Menseidov¹

Abstract – Functionalized polymer fibers with improved molecular orientation, surface texture morphologies, and piezoelectric and ferroelectric properties arouse great technical and commercial interest worldwide. Piezoelectric polymers are promising energy materials for carrying and implanting applications to replace bulky batteries in small and flexible electronics. Electrospinning is a universal technique for the production of nanofiber is used to improve the processing parameters and the chemical and physical parameters of Polyvinylidene fluoride (PVDF) fibers, increasing their dielectric and piezoelectric characteristics. The purpose of this review is to consider and systematize the techniques used in electrospinning with PVDF.

Keywords – Electrospinning, Polymeric Materials, Concept

I. INTRODUCTION

Electrospinning is an easy, flexible and cost-effective method for the production of fibrous membranes from fibers ranging in diameter from a few nanometers to several micrometers. It has several advantages over conventional methods:
- ease of use
- control of the fiber diameter
- spinning a wide variety of polymers

As a process it takes place that in four stages, shown in Fig.1. As shown, it begins with the application of high voltage and ends with the hardening of the jet in nanofiber. Between the droplet of the polymer solution formed on the tip of the needle and the metal collector, a high voltage of the order of 14 to 20 kV is applied. Different types of morphology are achieved with this technique. This is achieved by optimizing the parameters influencing the properties of the polymer [1,2].

Membrane obtained by electrospinning is called electrospinning nanofibrous membrane (ENM) and has attractive characteristics. These characteristics include: high porosity, pore size ranging from tens of nanometers to several micrometers, high gas permeability, interconnected structures with open pores and a large area per unit volume.

II. THEORETICAL BASIS OF ELECTROSPINNING

Electrospinning can generally be categorized into two ways with a needle and without a needle. Electrospinning using a needle begins with the preparation of a polymer solution contained in a tightly closed tank, which limits and practically prevents the evaporation of the solvent. Needle-based technology is characterized by the ability to handle a wide variety of materials, especially preferred for those materials that are extremely volatile [6]. Needle power transmission is suitable for the production of core-shell fiber structures. Another major advantage of this approach is that it allows precise monitoring of the flow rate, minimizing solution waste and operating with a small number of jets.

The advantage of needle-free power transmission is that it allows larger-scale processing of the material. The fact that the base of the installation is rotating or stationary uses a starting polymer solution for the production of
The needleless spinning process is vulnerable in that it is unable to produce a variety of fibers. Also, the many variables in the process, especially the flow rate, cannot be controlled [8,9].

A summary diagram of the electrospinning apparatus is shown in Figure 2. The polymer solution is placed in a syringe. To ensure even delivery of the solution to the needle, the use of a precision syringe pump to which the syringe is attached is required. According to the needs of the installation and the capabilities of the syringe pump, it is necessary to determine the type of installation required for the purpose, namely vertical or horizontal installation.

Figure 2. Summary diagram of the electrospinning

The potential of the current source is placed at the dosing needle at the end of the syringe. With its help the formed drop on the top of the elbow penetrates the electric charge and it will be possible to control the deposition on the collector. The figure shows a collector of grounded conductive plate. The adjustment of the distance between the needle and the collector in the horizontal position of the unit can be ensured by placing the collector on a movable stand. The process is designed to take place at room temperature and humidity [9].

Humidity affects the structure of the thread, forming porous fibers caused by rapid evaporation due to low humidity. This may be due to the fact that the evaporation of heat from the surface of the jet leads to its reduction of the surface. This can lead to the formation of small ice crystals on the thread. The microscopic ice crystals formed disappear when the fibers deposited on the collector are tempered with the environment [10].

III. NANOFIBER PRODUCTION TECHNIQUES

Based on the jet formation and the needle formation structure, electrospinning methods can be classified as:
- Multi-jet methods for electrospinning

This method of electrospinning uses many jets to form nanofibers. The production of nanofibers has increased compared to the rotation of needles. Due to the many jets, a uniform network of nanofibers is not formed, this is due to the filling effect between the jets.

We will consider several installations built by this method:

The interesting thing about this very jet electrospinning installation is illustrated in Fig.3. a rotating head was used.

On this rotating head, nine plastic nozzles are arranged in two rows with an inner nozzle diameter of 0.43 mm. These nozzles are 2 cm apart. The polymer solution is supplied to the head spray nozzles 0.2 bar; the solution flow rate is about 0.45 g / h. Nanofibers are collected, which form nine spots on the collector, no uniform network is formed [11].

This multi jet electrospinning installation is characterized by being physically mixed together. This installation contains four syringes placed on the setting, which moves along the track shown in Fig.4. The distance between the tips of the syringes is 3 cm, a rotating collector is used. The speed of the rotating tube layer and the movable stand can be controlled by a computer. The solutions were placed in different syringes as indicated. The successive nanofiber mats were collected on the surface of the film and dried at 80 °C in vacuum for 24 hours [12].

The microscopic ice crystals formed disappear when the fibers deposited on the collector are tempered with the environment [10].
Multi-needle electrospinning methods

In this group of multi-needle electrospinning methods, multiple needles are used as spinning nozzles that contain the same or different types of polymer solutions. High voltage is applied to the tip of the needles and the nanofibers are deposited on the collector. The main advantage of multi-head electric fiber is that we can mix different polymers at the required ratio.

We will consider several installations built by this method:

In this installation, three needles are used, which are mounted vertically. The polymer solution is pumped through syringes at a rate of 0.1 ml / min. shown in Fig.5. [12]

The idea of this technology is to study the bending of the electric field in different needles by using a limited number of components and to determine its consequences for the course of electrical fiber. It can be assumed that increasing the number of needles in the course of the action leads to a decrease in the electric field at the tip of each needle significantly due to the impact of the enclosing needles in the arrangement. [13]

![Fig.5. Electrospinning installation with multi-needle feed by means of three vertically placed needles](image)

IV. SOLUTION AND RELATED EFFECTIVE PARAMETERS

In electrospinning, the use of a solution is necessary, which in turn requires a solvent to dissolve the polymer. As a result, the choice of the appropriate solvent for the implementation of a homogeneous polymer solution arises. The main parameter of the solution is advantageous when choosing a solvent that is ideal for a particular polymer.

There are many variables that affect the production of nanofibers. This in turn leads to a variety of morphologies, such as homogeneous or intricate structures with different cross-sections, as well as structures of beads on fibers and individual pearls. All these critical factors are included in the choice of polymer type [14]:

- the molecular weight of the polymer
- conductivity of the solution
- the distribution of the lengths of the polymer chain
- solution viscosity and solvent properties
- surface tension of the solution
- polymer concentration

Also a defining property of the solvent is the boiling point, volatility and dielectric properties. External critical parameters that affect the final morphology of the fiber are the applied stress, the flow rate of the polymer solution and the collection distance [15].

Polyvinylidene fluoride (PVDF) is a highly non-reactive, inexpensive, flexible and conductive polymer with excellent chemical, piezoelectric and dielectric properties and can be used in electrospinning in the manufacture of many devices in flexible and piezoelectric electronics.

As the concentration of the polymer increases, the viscosity also increases, initially it is gradual, but later it accelerates. Within the resulting polymer solution, the intermolecular distance between the polymer chains in the solution becomes so significant that the interaction is considered weak [16].

The flow rate of the solution must be reduced to a minimum point at which the rotating jet can compensate for the evaporation of the solvent in order to maintain a steady flow of fiber [17].

If the flow rate is too high, the solution accumulates on the tip of the needle, breaking the Taylor cone necessary for the process to proceed. If the needle becomes clogged due to the high evaporation rate of the solvent, the needle becomes clogged.

V. CONCLUSION

In this study, the main parameters influencing the production of nanofibers for the production of homogeneous nanofibers were considered. Each effective parameter was individually considered to distinguish in terms of the principle of solution and obtained nanofibers by electrospinning. The process is extremely complex and must be organized with attention to the viscosity of the solution and the properties of the solvent, as well as the voltage and electric field. Also crucial is the flow rate and the collector distance. The geometry of the nozzle and the polarity of the solution and the humidity and temperature of the ambient air are also among the determining conditions for the electrospinning process in various applications.

Electrospinning in the future will be even more widely applicable in many areas such as ecology such as air filtration, water purification and many other areas.

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Types of Solar Cells and Their Material Design Features and Electrical Characteristics - Overview

Dzhihan Menseidov¹

Abstract – The challenge of our time is the release of carbon emissions into the atmosphere in the production of electricity considered in the green deal. Renewable energy sources such as photovoltaic panels are an extremely strong ally in this fight. In this article, we take a general look at silicon cells. Silicon solar cells are made of monocrystalline silicon. Polycrystalline silicon is a little effective, but popular. Other forms, such as amorphous silicon, are inexpensive to manufacture. Solar cells made of thin-film materials are the cheapest to produce, using techniques such as depositing money, spreading or even printing.

Keywords – solar cells, electrical characteristics electrical characteristics

I. INTRODUCTION

The conversion of natural daylight into electricity through a photovoltaic system is an environmentally friendly way to convert solar energy into electricity. As a result of the progressive pollution of nature and the increasing global warming, in Bulgaria there are economic and technical conditions for investing in electricity generation to obtain electricity from the sun. Under the influence of external factors of the efficiency of photovoltaic panels reduce the need to build a system for evaluating their characteristics. On the other hand, the rapid development of the production of panels is accompanied by the development of systems for evaluating their basic electrical parameters. Finding solutions for fast and efficient determination of the year and efficiency in the work of developing reliable and universal evaluation systems. The use of electronic devices for this purpose supports the quality and quantitative analysis of complex parametric relationships of processes in solar panels.

In order to ensure high quality of the Annual Journal of the Instructions for the authors

II. DEVICE STRUCTURE

Cadmium telluride is the most important thin-film material for solar cells, along with amorphous silicon. Single-layer solar cells have low theoretical efficiency; multilayer cells can provide much higher efficiency, but at a higher cost. Concentrating solar cells offer another way to increase efficiency. Meanwhile, newer organic and dye-based semiconductors offer extremely inexpensive alternatives. Each advantage provided by each of the cell types has the corresponding liabilities, so it is necessary to carry out a preliminary study for the region where they will be operated to obtain maximum efficiency from the type of solar cell used.

A. Polycrystalline solar cells

Polycrystalline Silicon (Poly-Si, pc-Si) cells are presented in Fig.1 cheaper, but with a lower energy conversion factor (h = 13-15% in series production and about 18% in laboratory models). Their name is due to the production technology, in which the liquid silicon is poured several times and after its hardening a structure with many crystals with dimensions of about 1 mm is obtained.

B. Monocrystalline cells

The first type of silicon is called Monocrystalline Silicon (c-Si). During its processing, the crystal is cut into extremely thin disks, about 0.2 mm thick, from which the cells themselves are made presented in Fig.2. The precision of the

¹ Dzhihan Menseidov is with the Institute of Mechanics at the Bulgarian Academy of Sciences and University of Telecommunications and Post, Sofia, 1 Acad. St. Mladenov Str, Sofia 1700, Bulgaria. E-mail: menseidov@gmail.com.
crystal growth process increases the market value, which makes single crystal PV cells expensive. Reducing the market value of cells is achieved by making them from ribbon silicon (Ribbon Silicon), which is also a single crystal, but in the form of a thin layer. The single crystal cells produced have an efficiency ranging from 13 to 18%. The efficiency of the panels is about 11-16%. Such a photovoltaic cell with an area of 100 cm² provides a power of 1.5 W at maximum lighting. By increasing the cell temperature from direct solar heating, the efficiency of silicon cells. Bifocal monocrystalline cells have recently appeared on the market - a new type of photovoltaic, whose design allows the collection of solar energy on both sides of the panel. According to the manufacturers, this increases the efficiency of the panels by about 20%. Bifocal panels are mounted on a pole so that the sun shines on both sides of the panel. [1]

The main representative of the materials used for thin-film technologies is amorphous silicon (Amorphous Silicon, a-Si). It converts light about 40 times more efficiently than single crystal, which allows the use of layers up to 1 mm thick, applied to a base of glass, steel or other material. Photovoltaic cells with a flexible plastic base are also realized. The typical structure of a thin-film photocell is shown in Fig.3.

1. Rear contact,
2. Amorphous silicon type N
3. Amorphous silicon type I
4. Amorphous silicon type P
5. Conductive oxide
6. Glass

As a great advantage of amorphous silicon is the significantly lower cost of the PV cell obtained from it. This determines its application in most devices such as calculators, garden lights and sensors. The disadvantage of the cells made of amorphous silicon is the lower coefficient of energy conversion with values between 5 and 7% in series production and up to 13% in laboratory installations.

D. Hybrid technologies

To combine the advantages of the described varieties, PV cells have been created, in which a very thin layer of amorphous silicon is applied on both sides of a plate of monocrystalline silicon type N. The alloying of the latter is too weak, due to which their resistance is between that of its own and an alloyed semiconductor fig.4. Because one layer is type P and the other type N, the transitions between them and monocrystalline silicon are different, which determines the name of the HIT Cell (Heterojunction with Intrinsic Thin Layer).
The hybrid cells have 5 layers:
1. Lower contact electrode,
2. Amorphous silicon type I and N,
3. Monocrystalline silicon type N,
4. Amorphous silicon type I and P,
5. Upper contact electrode.

III. MERGE CELLS INTO PANELS

Photovoltaic panels are sensitive to shading, unlike solar thermal panels. Shading a cell that is part of a chain of cells causes the cell to deviate from normal operation, which can lead to hot-spot or potential failure in the shaded cell. To avoid this, a bypass diode is placed in the module, which absorbs the current of the row of cells in case of partial shading. [3]

A. Sequential cell connection

When shading the string in series connection, two MRP maxima are determined for the operation of the inverter. Which of the two MPP points is reached depends on the shading at different times of the day.
- If the string is unshaded the inverter will run at the only maximum of the curve.
- If it is shaded while running - the more the modules are shaded, the more the left maximum of the graph will shift to a lower voltage. The inventory will also work in the left maximum, although there will be an MPP point in its right maximum, as long as there are a large number of shaded modules.
- If it is shaded before the panel is switched on - and there is shading at the time of switching on, the inventory will run at the right maximum. If the MPP tracking is not so correct, the inverter will continue to operate at the right maximum, regardless of whether the MPP point is located there. The voltage will be higher than in the unshaded area Fig.5 and Fig.6.

As shown in Figure 6, the voltage drop versus power is reciprocal to the number of shaded modules. I would like to note that these data are model-generated and recreate the actual behavior of series-connected photovoltaic panels.

IV. CONCLUSION

Sequentially connecting both maxima of the curve P / U are clearly expressed. When fewer modules are shaded the voltage is within the range of the inverter. For this
reason, both points must be taken into account. With a parallel connection, the inverter can only properly monitor the right maximum, as the left is weak and the voltage is too low. The left maximum can be traced if there are only a few shaded cells. In this case, the losses will be smaller. When connected in parallel, it is valid that the losses depend on the number of shaded strings. When shading two strings with two to eight cells, there is no change in the parameters, regardless of whether two or eight cells are shaded. In series connection, an increase in losses is observed after larger shaded cells. [5,6]

There are two main types of shading:

- Temporary sources - significantly reduces the light reaching the panel by partially or completely obscuring its cells. These can be branches of nearby trees, roofs of neighboring houses or other objects that cast a shadow on the panel during a certain part of the day.
- Permanent sources - these are contaminants that prevent light from reaching the cell, such as covering the panel, fallen leaves and everything stuck directly to the coating - dust, moisture and others. If even one of the cells in the panel is constantly shaded, the voltage from it will be reduced by half, which means that it will increase its resistance and reduce the voltage in the surrounding even more. If more cells are shaded, the panel will not convert any solar energy, it may even behave like a load.

In this paper the instructions for preparing camera-ready paper for the Annual Journal of the University of Telecommunications and Post – Sofia are given.

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