Dear readers,
Dear authors and friends,

This year we will continue to propose to your attention a large variety of scientific articles covering different aspects of management as well as recently occurred managerial problems. Due to the specifics of external business environment and its complexity as a result of numerous factors such as globalization, but also behavior of global players (from one side big international organizations and from the other - the leading national economies), there are a lot of problems that the management of the today’s business has to solve both in operation and strategic level.

In this regard we really hope that our magazine will continue to provide a decent scientific platform for young researchers but also for respective scientists with international reputation.

Current Issue of the magazine is dedicated to the managerial specifics in communication in virtual environment, which in today’s world of information and communication technologies will become an increasingly important aspect of the operational management tools. We propose to your attention also an article, dedicated to the psychological characteristics of the modern leader, which is always a topic with high degree of actuality. The last two articles explore comprehensively concrete specifications of the energy / transport sector of economy as key sector of the global economy.

Kind regards of all our readers!

International Editorial Board
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Professional meetings of organisation management in virtual environment – features and challenges

Miglena Angelova

Abstract — The development of the new technologies provides managers with a set of various tools useful for all managerial levels and applicable in almost all important managerial functions and activities. Modern business could organize professional meetings in virtual environment no matter of physical distance between participants. The only basic requirement is related to the Internet access. Specifics and challenges of planning, organisation and conducting these professional meetings are in the focus of the present article. Our major goal is to reveal characteristics of e-meetings and to draw some of the important challenges that will allow improving the quality of professional meetings in virtual reality. In addition, special research among Bulgarian managers from different hierarchical levels was conducted in order to analyze their attitude and opinion on the using of e-meetings as a part of traditional working activities. Our findings reveal interesting picture and results are strongly influenced by the economy sector, in which the company operates. However, these managers who claim that use e-meetings admit also for several important limitations due to the technical obstacles. The present article is an attempt to summarize and put under analysis these specifics of the professional meetings in virtual environment.

Keywords: e-meetings, virtual environment, e-platforms for on-line meetings

JEL: M10, M19

I. INTRODUCTION

In order to be competitive, today’s companies have to be more flexible, more adaptive, more sensible to the rapid changing requirements of the business environment, to introduce a set of innovations helping not only different managerial levels, but also employees in their daily working activities. Therefore, the development of the new technologies and its achievement offers manager various solutions in almost every important part of their work. In economic sectors with high degree of innovations, these new technological solutions are put in use as soon as possible. For the rest of enterprises their implementation is a subject of managerial decision but if some solution is well accepted in the individual life of persons, then it has a greater chance to be applied in business organisations. Different technological solutions for communication in virtual environment are widely applicable both in personnel and professional field. Once accustomed to the new technological capabilities (in communication) on a personnel level, people are more likely to accept them as a part of their usual work practice and activities.

Certainly the engine of this new communication practice are namely companies with high degree of innovation climate, which are able to recognize, embrace and impose the potential of one new technological solution and to be enough brave to implement it in the working process. In this regard, the development of new communication solutions is logically supported of high-tech companies trying to gain competitive advantage. The current article is dedicated to these technological solutions allowing planning, organizing and conducting a business meeting in virtual environment. Specifics in communication at meetings conducted in virtual environment, including specifics in communication during decision-making process in such type of business meetings are analyzed and discussed. In addition, special research among Bulgarian managers from different hierarchical levels was conducted in order to analyze their attitude and opinion on the using of e-meetings as a part of traditional working activities. Our findings reveal interesting picture and results are strongly influenced by the economy sector, in which the company operates. However, these managers who claim that use e-meetings also admit for several important limitations due to the technical obstacles. The present article is an attempt to summarize and put under analysis these specifics of the professional meetings in virtual environment.

II. LITERATURE OVERVIEW

Business meetings and its goals are widely discussed matter both by practitioners and scholars. Their importance as an useful instrument in daily working life is visible in almost all aspects – internal meetings – meetings of managerial team with CEO or meetings between employees and their manager; as well as external meetings with authorized representatives of the organisation with potential or current partners and subcontractors. Whatever the concrete goal of the business meeting is, the importance of this tool is obvious and out of any further discussion. Therefore the interest of practitioners and scholars to contribute to this subject remains logical and understandable. Koester and Handford focus attention to the Hypothetical reported speech in business meetings. They admit the following: While the past two decades have seen many empirical studies on direct reported speech (DRS) in spoken interactions, fewer have focused specifically on hypothetical reported speech (HRS)… HRS was found to occur as part of specific sequential patterns, and was used largely as a persuasive device, fulfilling a range of related rhetorical functions. Like DRS, HRS can project either a sense of involvement or detachment, but unlike DRS, also allows speakers to generalise; detachment...
and generalisability being particularly relevant to a business context (Koester, Handford; 2018). Oittinen and Pirainen-Marsh presents interesting research, dedicated to the different techniques of opening in technology-mediated business meetings. The authors claim the following: The prerequisites for opening a meeting, or beginning any kind of interaction for that matter, are participants’ presence and shared orientation towards the situation at hand… Drawing on video-recorded meetings in an international company, it documents the multimodal practices used in the process of establishing co-orientation to the shared meeting space and achieving entry into the meeting. The analysis shows that the stepwise unfolding of the opening phase requires the coordination of verbal and bodily conducts as well as the affordances of the technological artefacts utilized (Oittinen and Pirainen-Marsh; 2015). Gritsenko explores in depth the specific of group communication in virtual environment. He consider: In the digital age, group communication migrates online. Web forums serve as communication hubs for people who work together to solve particular problems. The author uses qualitative content analysis and interviews to determine whether discussion threads on an IT user forum could be viewed as group communication in the traditional scholarly interpretation of the term. The findings suggest that online discussion threads dwelling on non-mainstream issues have all five features of face-to-face group work – size, interdependence, task, identity, and norms. The scholar concludes that though online forums introduce limitations to interactions, discussion threads can indeed be viewed as group communication (Gritsenko; 2016). Exploring the specifics of digital communication and its applicability at work, Mukherji and Arora admit: Communication in the 21st century has moved forward by leaps and bounds from the realm of Aristotle’s ‘rhetoric’. The study of communication as a discipline drew the attention of scholars around the early 20th century and gained momentum after World War II. From being a subset of sociology, psychology, political science and organisational behaviour, the study of communication as a discipline by itself was taken forward by scholars like Lazarsfeld, Lasswell and Schramm. A quantitative orientation was provided with the development of cybernetics and information theory. Modern technological advances have enabled today’s generation to function in the era of virtual communication. An organisation is no longer encased within geographical boundaries. Team members are often physically dispersed, work across time boundaries and have multiple reporting relationships. The concept of team has become dynamic as membership of teams shift regularly (Mukherji, Arora; 2017). Ranney and Troop-Gordon analyze the specific in digital discussions and characteristics of conversation process. They present a profound survey and summarize: To understand the effects of information and communication technologies (ICTs; e.g., texting, instant messaging) on conversational processes and socioemotional well-being, researchers have often relied on experimental designs in which unfamiliar adults engage in relatively superficial conversations. This paradigm limits our understanding of ICTs, as individuals rely primarily on ICTs to converse with close others, in more intimate discussions. To address this limitation, this study examines the use of ICTs by friends engaging in problem-focused discussions. Fifty-three female friend pairs engaged in problem-focused discussions in an ICT-mediated or face-to-face context. Observers rated the degree to which individuals exchanged information, dwelled on negative affect, rehashed problems, and speculated about problems. Participants provided ratings of perceived self-expression, similarity, self-disclosure, positive and negative affect and closeness with the friend. Participants in the ICTs condition reported less positive affect after the conversation than those in the face-to-face condition. Although participants interacting through ICTs exchanged less information, rehashed problems less, and reported lower levels of perceived self-expression, they experienced higher levels of perceived similarity and self-disclosure. Discussing problems through an ICT was indirectly related to dampened closeness through observed information exchanged and enhanced closeness through perceived similarity (Ranney, Troop-Gordon; 2015). The scientific team from Netherlands conducts a survey among 1222 employees in creative industries in attempt to determine the important digital skills. They admit the following: The current workplace increasingly asks for workers with highly digitally skilled knowledge who produce and distribute ideas and information. As such, understanding the factors behind differences in the level of various 21st-century digital skills is of decisive importance. They examine the level of 21st-century digital skills among knowledge workers, and the determinants contributing to the level of these skills. They explore in depth the following digital skills: information, communication, collaboration, critical thinking, creativity, and problem solving. Potential determinants that can be influenced by stakeholders are also included, such as social support and training. The results show that the level of 21st-century digital skills varies considerably. Furthermore, each 21st-century digital skill is explained by a different set of determinants, thereby requiring unique approaches for the development of each skill (van Laar; van Deursen; van Dijk; de Haan; 2019).

III. SPECIFICS OF ORGANIZATIONAL MEETINGS IN VIRTUAL ENVIRONMENT

At first glance there are no such significant differences between traditional direct business meetings (face to face) and business meetings, conducted in virtual environment, but the similarities are only apparent on the surface. From managerial point of view both types of meetings possess its important elements such as: time oriented (precise date and time); participants (number of people – internal or external for organisation who are invited to the meeting); place, where the meeting will be conducted (geographical location or e-platform for business meeting). On the other hand we have also content elements of the meeting – aim of the event, major problematic topic of the meeting, agenda, moderator, initial preparation activities results etc… All-important elements of the business meeting are presented on fig. 1.
These outlined elements of the business meetings presented on figure above are obligatory, regardless the type of the meeting – online or direct face-to-face. The major difference is the environment, which could be described as essential characteristic for the manner through which a business meeting is moderated and conducted.

As a result of the virtual environment in which on-line meeting takes place, we could outline various restrictions that both moderator and participants have to comply with from the contextual point of view. On the other hand, when we explore the specifics of the business meetings, which take place in virtual environment, we have to consider that there are several important technical requirements, which could be described as obligatory for any participants in the business meeting. These requirements are presented on fig. 2.

As we can see from the figure 2, although geographical distance is no longer a big challenge for participation of the meeting (possible in virtual environment), all participants...
of the online event have to be provided with technical basic equipment. Once each of the participants has the technical equipment, the next step comes the choice of the e-platform or programme or special application for online meeting. The different options in this choice are really diverse and numerous – from functions of pure social medias such as Facebook and Instagram, through different communication applications such as WhatsApp and Viber to special platforms such like Microsoft Teams, Zoom etc. This choice as usual is subject of a managerial decision, but on the other hand, the answer could be found in the organizational culture and the programme/platform/application that the major part of participants is accustomed with. In this sense the online meeting could be considered as a logical continuation of a normal and traditional working activities but this time in the virtual environment.

The online business meetings have slight differences comparing to the traditional ones in terms of managerial approach, but on the other hand there are several important restrictions that have to be outlined and put on the further discussion. They are graphically presented on fig. 3.

As the restrictions, due to the technical specifics of meetings in virtual environment are concerned, the major of them are connected with lack or partially visualization of speaker or participants. This restriction could be considered as not so important, but only at first glance. If we have a profound look, we will understand that the lack (in full degree or partially) of the visual access of speaker and participants of the meeting in fact deprives us of the important information due to the lack of nonverbal communication signs, facial expression and gestures. Information, collected from nonverbal communication complete the official one. Therefore each participant in traditional direct meeting could check official information with the nonverbal communication and to conclude for himself whether he can trust the communicator or not. On the contrary, in online meetings such type of check is really difficult to be executed and the participant has to confess only on the official speaking. Sometimes in business negotiation for instance, these restriction could play very important role in the overall negotiation process. Something more – in case of discussion of a difficult topic, the lack of personalized view of the participants could influence on the impossibility of gaining of initial supporters and partners of some idea. All restrictions coming as a result of the technical specific of the platform could be consider as direct challenges and concrete tasks for future work of technicians and developers. The logic of the last few years is leading to the fact that the technological progress is strive to approach the virtual reality as much closer to the real as possible.

Contextual restrictions could be considered as essential for the online meeting which frame several important specifics of these types of meetings (fig. 3):

1. Strong moderator activities and skills – the role of moderator of the meeting is important as usual, but here (meetings in virtual environment) the moderator is in the heart of the event. The moderator conducts the event, but due to the specifics of the virtual environment (muted microphones of the rest of the participants in the major part of the meeting), in case of discussion the moderator has to be more precise and correct than usual. Therefore the meetings in virtual environment require strong moderator skills.

2. Relatively passive role of the participants during online meetings – most of the time participants of the online meetings are with muted microphones due to the fact, that more microphones switched on at the same time means introducing unnecessary noise of the communication channel and respectively – difficulties in listening and understanding of speaker. On the other hand, this muted microphone could be considered as barrier (not so strong, but still available) in front of the desire of taking the floor. If we consider the case when the moderator of the meeting is CEO of the company himself and there is a discussion, only few numbers of employees could dare to express their sincere opinion freely (especially without visual support from other participants). Something more – usually in virtual meeting each participant is alone and therefore it is difficult to feel the support of the rest of the team members.

3. Difficulties in dialogue interactions – again due to the specific of the environment, the interactions of dialogue are limited and the dialogue usually could happen only on the general topic (but not profound details). Having in mind this specific, the managers could combine different channels. If some online meetings require profound discussion, initial information could be sent via e-mails with the deadline for comments and recommendations. Thereby each of participant will have enough time for preparation, will have the time for forming own opinion as well as to check with the other participants (coalitions and partners). Therefore the proper planning and preparation of the online meeting could be defined as key elements of the meeting success or failure.

4. Difficulties in online vote procedures – in case that the agenda provides vote, the managerial options here are really restricted. In small groups (up to 10 people) this vote in virtual environment could be with simple individual speaking of each participant claiming “for”/ “against” or “abstain”. But this solution is not applicable in big meetings or in case that the vote has to be secret. This limitation is also one of the biggest weaknesses of the available tools for online meetings.

In summary of all these restrictions of the meetings which are conducted in the virtual environment, we could say that online meeting require from managers more initial work in planning and organizing the meeting; strong moderator skills and sensibility to the participants; ability to build trust of the participants in the situation where they are initially limited due to the virtual environment; strong managerial skills to know team members (employees) and high quality initial work to study potential partner/contractor/subcontractor in case of online meeting with external for organisation participants. Based on these specifics of online meetings we are able to present the specific situation where online meetings are preferable than the traditional face-to-face meeting (fig. 4).
Online business meetings

Restrictions due to the technical specifics
- Lack of full visual identity of the speaker
- Lack of visual access to all participants at the same time
- Impossibility of having personalized view of the participants

Contextual restrictions
- Strong moderator activities and skills
- Relatively passive role of participants
- Difficulties in dialogue interactions
- Difficulties in online vote procedures

Meetings in virtual environment

Suitable for
- Managerial meetings with strong preparation initial activities (ensuring enough time for participants to be prepared before the meeting)
- Managerial meetings for trivial/operative matters
- Physical distance between participants
- Clear usual activities and working tasks

Unsuitable for
- Negotiation process
- Strategic important discussions
- Important votes
- Internal micro crisis
- Lack of trust between

Fig. 3. Technical and Contextual restrictions of online business meetings

Fig. 4. Possible applicability of business meetings in virtual environment
In order to reveal the experience in practice of the Bulgarian managers in online business meetings, we conducted a special survey among 32 managers in different level of managerial hierarchy. The results are summarized on fig. 5. As it can be seen from the figure, the summarized results form interesting picture, which is slight different depending on the managerial level. As one of the obvious similarity is the fact, that all managers claim using the online meetings in a monthly base. The large numbers of managers, who admit that never use or participate in the meetings in virtual environment, are middle managers (almost 35%), followed by senior managers (20%). The large number of managers, claiming the usage and participation of meeting on daily base is among the Executives (12%). On the other side, 35% from the executive admit using online in weekly base. Our survey is conducted on an anonymous and voluntary principle via Internet (Google Forms) and includes answer from managers of organisation in different economic sectors.

This picture could be totally different if we explore the specifics of concrete economic sectors, especially those in high tech. Now we have only general observation, which is the following: only 3% fro the Bulgarian executives claim that have never been in online meetings (as participant or organizer), the percentage among senior manager is 20%, and among middle managers – 35%. Therefore we could conclude, that type of work in higher levels of management requires more frequently the online meetings.

CONCLUSION

In today's increasingly global world, the opportunities that the progress of communication and information technologies provide us are becoming more important and more applicable in everyday personal and organizational business life. Thanks to the development of the technologies, business meetings can now be held regardless of the physical distance of the participants. We are already accustomed, both in personal and professional field, of being constantly connected to the internet and reaping the benefits that the global network provides. In this regard, business meetings organized in a virtual environment will be an increasingly used tool by Bulgarian managers in an attempt to gain a competitive advantage and improve the company’s results.

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Specifics of Communication Management of organisations in virtual environment

Miglena Angelova

Abstract — The new technologies allow intensification of organisation business communication via on-line tools, respectively in virtual environment. In terms of management, this opportunity for communication (as an integral and supported part of the overall management of organisation) gives leaders a total new approach in order to manage easily teams, groups, and individuals. The aim of the paper is to present the major specifics of organizational communication in virtual environment based on the business organisation experience gained so far and the analysis of the existing scientific literature. We explore the elements of the traditional communication process and compare to these of the communication process in virtual environment. As a result, we will outline weaknesses and strengths of the traditional and virtual communication in the context of the organizational management. Our main conclusion is that virtual communication could be considered as a useful managerial tool in case of physical distance between communication participants, but on the other side, the traditional form of direct communication rests preferred both from managers and employees. Specifically in the professional meetings in virtual environment.

Keywords: Virtual Communication Management, Communication process; Digital Communication, Virtual environment

JEL: M10, M19

I. INTRODUCTION

Modern world is a world of new technologies influencing literally every piece of our personnel and professional life. Today’s competition is so strong and complex that forces managers constantly to looking for new opportunities for competitive advantages. One direction of new technologies focuses on the new ways of communication offering technological solution for distance on-line communication but with almost full package advantages of direct communication. Smartphones, different elaborated apps, on-line platforms for group communication allow intensification of communication and could be successfully used for professional purposes. Therefore nowadays communication in virtual environment is no longer a priority only for leisure and a pleasant opportunity of spending free time as personnel decision, but turns also into a leading opportunity for enterprises in their striving to improve the results and positions. From totally virtual organisations to modest family firms – each business organisation uses to a different degree in everyday business life communication in virtual environment, direct result of the technological development and innovations.

The major aim of the present article is to compare the specifics of communication management of organisation in traditional communication process to those in virtual environment and on this base to outline the leading characteristics of the managerial process of communication in virtual environment. Once these characteristics are identified the managerial process of virtual communication could be put under optimization in terms of time saving and resource using (human, financial, technological).

II. LITERATURE OVERVIEW

Different forms of communications in virtual environment are focus of numerous researches from different scientific aspects. Understandably the main accent of the researches is put on the specific of this communication and its reflection to the young people (due to the fact that they obviously prefer this way of communication, including in case that they have direct access to the other participant/s of the conversation). On the other hand, the possibility of real communication that new technologies offer is used successfully in business life and business activities especially in case of having international teams or multinational corporations located in different geographical places. Glikson and Erez explore the specifics of communication climate in virtual teams. After conducting a profound research covering sixty virtual teams, they prove the hypothesis that relationally-oriented content, communicated in the first message, and exchanged between virtual team members, facilitates the emergence of psychologically safe communication climate, which in turn improves team performance (Glikson, Erez; 2019). Working specifically in the same field, an USA research team concludes: As virtual teams are becoming more frequently implemented within organizations, research examining the effect of virtual tool use on team functioning has correspondingly expanded. One primary focus of this literature is the impact of virtuality on team communication. However, findings remained mixed. Specifically, the impact of virtuality on the mechanisms between communication and performance as well as the simultaneous moderating effect of contextual factors on this relationship remains to be fully examined. One reason for this lack of clarity stems from ambiguity regarding the elements that constitute communication (Marlow, Lacerenza, Salas; 2017). Laitinen and Valo conduct qualitative study exploring the role and meaning of the communication technology in virtual teams. As results, they claim the following: Communication technology has several meanings—it is seen as a tool for work, a reason for uncertainty, a useful benefit, a challenge, an object of competence, an entity of technical properties, a subject of

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guidance, a way to express closeness, and a shared space. The results deepen our understanding of the role communication technology plays in the day-to-day interaction of virtual teams. The results recommend developing both technological systems and team members’ ways of using them, as well as providing opportunities to negotiate the meanings of technology and thus avoid frame disputes (Laitinen, Valo; 2018). An Indian scientific team presents a research focusing on the different aspects of the effectiveness of the virtual teams. The scholars define several critical characteristics that are essential for the effectiveness of one virtual team: trust; information sharing in the virtual teams; role of communication in the virtual teams. Concerning the last one characteristic for the effectiveness, the authors admit the following: All the computer-mediated communication technologies face the same drawback due to the lack of verbal and nonverbal cues, compared to traditional face-to-face communication. The verbal cues (i.e. tone of voice, verbal hesitation, volume) and non-verbal cues (i.e. facial expression, body movement, emotion) are however important sources to process information from team members for tasks. Compared with face-to-face teams, virtual teams face problems such as “decreased social interaction, communication, and emotional expression”. The human and technology aspects need to be managed so that virtual teams with attributes like high performance, high commitment, and high cooperation and communication (Bhat, Pande, Ahuja; 2017). The same topic concerning the effectiveness of the virtual teams is the object if another research. The scholars develop a conceptual model, which hypothesizes a relationship between knowledge sharing, trust, collaboration, and team effectiveness in virtual team settings. The findings suggest that knowledge sharing positively influences trust and collaboration among virtual team members. The findings also suggest that while trust positively influences virtual team collaboration, it does not have a significant direct effect on team effectiveness (Alsharo, Gregg, Ramirez; 2017). Again trust is the leading characteristic for effective virtual teams, according to another research. The authors especially outline the role of building trust relationship among members of the virtual team: While all successful managers must ensure that they have provided the basic organizational support for their employees, especially effective leaders also ensure they build trustworthy relationships (Ford, Piccolo, Ford; 2017).

An international research team from China and USA explores the role of social media in the communication process and its reflection to the effectiveness on the virtual team collaboration. They summarized: Inter-organizational projects face unique challenges and opportunities due to team diversities and task complexity. Mobile social media like WhatsApp and WeChat emerge as new-generation collaboration tools in such endeavors... The results of a larger-scale survey confirm that tool usability, task fit and team connectivity contribute to virtual collaboration effectiveness, which affects project management success and team appreciation. In addition, there are noticeable cross-country differences, especially the opposite moderating effects that degree of use impose on the relationship between virtual collaboration effectiveness and project management success (Zhang, Sun, Yang, Wang; 2018). The research of two German scholars also outlines the specifics of virtual teams, based on the profound study on the existing literature. They point out the following numerous leading factors that influenced the virtual team performance, classifying them into the seven general categories: 1. case studies (with the following factors: social online activities and non-hierarchy); 2. communication (factors: routines and dedication to teamwork); 3. distance (factors: psychic distance and time lag); 4. goal (factors: goal specification and shared mental model); 5. group (factors: individual properties, culture and virtuality of team); 6. management (factors: technology use and management skills); 7. technology (factors: technology properties and team support). They also concluded: A lot of assumptions concerning VTs seem to be made in the light and under the influence of knowledge on traditional teamwork. Analyzing these assumptions leads to unexpected insights, such as the example of the psychic distance paradox. A second intriguing example is shown through the study on how severely online and offline culture can differ within one cultural sphere. This implies that the workforce, including management, needs enlightenment, awareness and training apart from traditional intercultural competencies (Großer, Baumöl; 2017). Exploring the role of new technologies in the sphere of digital communication, Mukherji and Arora claim: Modern technological advances have enabled today’s generation to function in the era of virtual communication. An organisation is no longer encased within geographical boundaries. Team members are often physically dispersed, work across time boundaries and have multiple reporting relationships. The concept of team has become dynamic as membership of teams shift regularly (Mukherji, Arora; 2017).

From different point of view is another study presented by Wu, Mattingly and Kraemer. Scholars explore the differences of communication in virtual environment based on the spatial cues and gender. They reveal the following: Verbal behavior differs in high and low-spatial cue virtual environments; Male and female participants interacted with a confederate in each environment; Text analysis of conversation logs revealed differences by gender and environment; Both factors influenced linguistic metrics, particularly measures of collaboration; Results suggest that spatial cues benefit social connection in virtual environments (Wu, Mattingly, Kraemer; 2015).

There are also a number of national researches dedicated to the different aspects of digital business communication, such as study for e-business communication in the field of the real estate (Duneva-Stoyanova; 2019) or research for global Internet practice in Business Communication and their influence in Bulgaria (Mironova; 2019).
III. Specifics of Business Communication in Virtual Environment

Business Communication in Virtual Environment possesses numerous specifics mainly as results of the technological solution through the help of which the communication is happen. However, the major differences between traditional business direct communication process and the business communication in virtual environment are graphically presented on fig. 1.

![Diagram showing differences between Traditional direct communication process and Communication process in Virtual Environment](image)

**Fig. 1. Differences between Traditional direct communication process and Communication process in Virtual Environment**

![Diagram showing basic technical elements for communication in virtual environment](image)

**Fig. 2. Basic technical elements for communication in virtual environment (for both communicator and recipient)**
As it can be seen on the fig.1, the communication process in virtual environment is rather complex than the traditional one. The real benefit of the traditional direct communication is the fact, that the communicator and the recipient are at the same time in the same place which allow to have direct visual contact and to share also all nonverbal communication signs. Both processes allow feedback, which is hugely important for any communication (without paying attention to the character of the dialogue – personal or professional). Tow-steps communication allowing giving the feedback and transfer of the role between communicator and recipient (on the first stage the communicator sent a message to the recipient and on the second stage the recipient himself becomes a communicator sending feedback) has also huge importance and in the business field, giving full clarity of the transferred messages. This dialogue could continue until both sides are completely satisfied from the quality and clarity of the shared information. The essential difference between normal direct communication process and communication process in the virtual reality could be found in the technical tools through which the communication is happen.

When we consider business communication in the virtual environment, then as one of the important specifics as an absolutely base for such type of communication is access to the Internet. Here we could speak for two important elements, which have to be available at the same time, in order to secure communication in virtual environment: first one is the availability of Internet access (through wifi or optic networks etc.) and the second one is the availability of the tool for Internet access (smartphone, tablet, computer or other technical tool). Basic technical elements for communication in virtual environment that are obligatory are presented graphically on fig. 2.

Once the communicator and recipient have all this presented technical equipment, there is two major possible ways of communication in virtual environment: asynchronous and synchronous communication (in terms of time). In case of asynchronous communication the main restriction is the timing of the conversation. The specifics of asynchronous communication process, weaknesses and strengths are presented on fig. 3.

Asynchronous communication could be considered as useful tool that has two general strengths – first of all, this type of business communication is suitable in case that there is a huge geographical distance between all participants of the conversation – including in case that there is a significant time difference when the involved persons are in the different continents. In these cases the asynchronous communication is preferable due to the convenience of the active time of the day of the participants. Having in mind that the subject of conversation rests strongly professional and therefore important, then the managerial team has to secure the equal possibility of participants in terms of needed time to contribute qualitatively to the conversation. Here the management has to secure also the equal timing in case for data collection or any other activities expected from the participants of the conversation. The second also important strength of the asynchronous communication is due to the specifics of the written communication, where there is a clear evidences on all important elements: who assigns the task; what are the requirements; deadlines, responsible persons etc. In case of complex tasks with many participants and different activities and requirements, the written communication is preferable.

As far as synchronous communication is concerned, the specifics, including its strengths and weaknesses are presented on fig. 4.
In general cases, synchronous communication in virtual environment is preferred due to the easily way of its execution, which lead to the timesaving. On the other hand, there are several of limitation, generally connected to the number of participants and the type of subject discussed. Synchronous communication is preferred for small groups (maximum 4-5 persons) with high level of trust between them and for operative everyday activities. For more complex business tasks thus type of communication has to be supported by written communication, which clearly and undoubtedly identifies important elements such as tasks, responsible person(s), deadlines.

Both types of business communication in virtual environment in fact use the benefits of the technological progress. Therefore effective managers have to combine and use in full degree and in everyday base all types of communication – traditional and through Internet. Admittedly the technological progress gives managers new possibilities to develop and improve managerial instruments. When we consider the communication process as one of the essential in organisation, that are integral key part of all major managerial functions such as planning, organizing, leading and controlling are, therefore the focus of new development of communication through new technologies has to be included in the managerial agenda. Results of the author’s special survey conducted among 53 managers (covering middle, senior and executive level of management) on the types of communication they used reveal really intrigue picture (fig. 5).
As it can be seen from the fig. 5, according to the results of the survey, the Executives and the Middle level managers spend more time in traditional direct communication, which fact could be easily explained with the specifics due to the hierarchical positions. Executives have to participate in numerous direct meetings and events on strategic level – for new partnerships and initiatives, while the middle level managers have to be closed to their teams. Therefore the direct traditional form of communication is preferred for these two positions. On the other side, we could see that all types of managers almost equally use the asynchronous Internet communication. This fact again could be easily explained with the usage of e-mail communication for more complex and difficult tasks that require sharing various files and information. Here we have to include also the fact that many companies nowadays possess Intranet channel, which also be used as asynchronous communication tool in implementing team task for instance. Anther interesting result is presented by the answers of the senior managers. According to them, they prefer using Synchronous Interval Communication on daily base. Again this curious on the first look result could be referred to the type of work they are responsible for. In general case senior managers are the connection between executive and middle management which fact could determines the types of communication used in daily base. In terms of time and effort saving, synchronous internet communication gives them perfect technological solution to execute their professional function in high quality way.

Here, when we consider the type of communication used in different managerial levels of organisation, we have also to point out that communication tools used in different hierarchical levels depend also and on the type and size of organisation, on the specifics of the economic sector that organisation operates, the intensity of innovations and new technology of the company etc.

CONCLUSION

Communication and communication process is essential for the development of business organisation. Communication is the base of any organizational and business activity and therefore could be considered as an integral part of organizational life. Due to the development of new technologies, nowadays managers possess technological tools allowing almost direct communication without paying attention to the geographical distance, number of participants in conversation or complexity of the discussed problem. Therefore today for one effective and successful manager is not enough to be a good communicator, but it is also important to know how to combine and use the straights of all available communication channels and tools taking into account the specifics of the discussed issues from one side and the specifics of the participants of the conversation from the other.

Modern technical solutions provide managers with different options to communicate, to make more precise decision, to orientate better in the complex business environment, which becomes even more difficult and perplexing, to be understood. In this regard managerial decision on the topic with not so grate importance at the first glance, will become crucial for company’s internal climate and as a result – its ability for adaptability and flexibility. In all-important managerial functions and activities communication plays key role and in near future one of the requirements for the effective manager will be to know and use all available technological solutions for communication, but even more importantly – to possess clear judgment combining in practice their straight with the specifics of message and the characteristics of the target communication group.

REFERENCES

Psychological analysis of the personality of the manager
Emiliya Duneva

Abstract — A manager's success in the social sphere is closely dependent on his personal qualities and abilities, professional interests and motivation. This article analyzes the leading paradigms on the basis of which practical approaches to the activities of the manager are derived in order to turn them into full-fledged ones in the process of their management practice.

Keywords: personality of the leader, stress, qualities of the manager

JEL: D29

I. INTRODUCTION

For the past decade, one of the most highly discussed topics is the relationship between the concepts of management, performance and stress. Performance management and stress are some of the most important functions of a manager's personality, related to organizational results and success.

One of the basic meanings of the concept is this social image that the individual adopts in order to fulfill his social functions, to play his social role. In other words, personality is that of man (or man) which can be understood by relating it to society; with social norms, with social practice, with other people. (Vassilev.V., Psychological foundations of management. Sema 2001, Plovdiv, pp. 204-205) In this general conception of personality, at least two meanings and aspects can be distinguished:

Personality serves to express the organization and integration of both the numerous mental qualities of the leader and his various actions. The personality is considered in relation to both the life history of the individual and the prospects of his future development. (Vassilev.V., Psychological foundations of management. Sema 2001, Plovdiv, pp. 204-205).

Stress is a universal and general challenge for the personality of the leader. The ever-changing demands of the work world and the onset of crisis situations can increase stress levels among employees and managers. According to the International Labor Organization, stress is recognized worldwide as a major challenge to the well-being of employees and managers and to the state of organizations. Many researchers describe it as the "disease of the 21st century."

II. LITERATURE OVERVIEW

A manager must have certain qualities in order to master all the activities in the company in order to be able to see the specific problems and to identify the appropriate strategy for their solution. The qualities of the leader, depending on the degree to which they are manifested and how they are combined, form the leadership style of the manager. There are various concepts for defining the qualities of a leader, and perhaps one of the most popular is that of Warren Bennis. It explores the characteristics of 90 successful managers and brings out the following four groups of qualities:

Attention management: engaging followers to achieve goals.
Knowledge management: managers are able to convey the meaning of the created image in an understandable way as a basis for their acceptance by followers.
Trust management: thanks to perseverance and consistent action, managers receive full support from their followers.
Self-management: managers know their strengths and weaknesses very well. In the process of overcoming weaknesses, they are able to identify additional resources. Bennis emphasizes in his research that managers must look for solutions to create a work environment that allows people to develop their potential to solve the tasks. In this regard, four groups of qualities can be defined, which are largely conditional, because the practice does not always confirm their relationship with management.

Physiological qualities: height; weight; figure, appearance or representation; Health status; vigor of movements, etc.
Psychological or emotional qualities: flexibility, initiative; honesty; vigilance; courage; self-confidence; balance; ambition; vigor; power; need for achievements; persistence; independence; independence, etc.
Mental or intellectual qualities: mind and logical thinking; education; prudence; conceptuality; insight; curiosity and cognition; originality; intuition, etc.
Personal business qualities; ability to gain popularity and prestige; organizational skills; ability to persuade; ability to be reliable; tact and diplomacy, etc.

Another popular concept is that of Lori Mullins. It connects the professionalism of the manager with three groups of competencies.

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1 Bennis, W. To become a leader of leaders. Q: Rethinking the future. S., 2001
Technical competence: the need to have certain knowledge, methods and habits for solving certain tasks, primarily for training of their subordinates / associates /, as well as for conducting operations related to the current activities of the organization - production of goods and services, training, etc.

Social habits and human qualities: necessary in interpersonal relationships and evaluation activities. A distinctive feature of a successful manager is the ability to ensure efficient use of human resources, which include the organization of interactions, leadership and coordination of efforts, rapid response to situations and flexibility of management style.

Conceptual abilities: necessary for understanding the action and the organization as a whole, incl. and the environment, which allows strategic planning to be carried out and everything to be subordinated to the accepted goals for achievement.

Based on the study of the leading companies in Europe, Helber, for his part, points out that the century of all managers with traditional qualities is over and there is a need for new managers with other merits. He singles out ten development strategies, typical for the new generation of managers:

1. Leadership qualities;
2. Striving for radical change;
3. Wide cultural knowledge;
4. Constant pursuit of growth;
5. Development / exploitation of the organization / - search for new approaches to the organization of management and activity;
6. Maintaining the spirit of competition by using new paths to success;
7. Constant striving for renewal and prevention of the slightest signs of stagnation;
8. achieving what people can motivate themselves with;
9. skills to work in a team;
10. Achieve, in general, the highest quality.

Functional and situational competence, according to the authors of the model, characterize the professionalism, and intellectual and social competence. Functional and situational competence, according to the authors of the model, characterize professionalism, and intellectual and social competence - the psychological stability of the manager.

Julian Rotter's theory is that people interact with their important environment. Man's reaction to the events of his environment depends on the significance or importance he ascribes to these events. Rother suggests that human behavior results from the interaction of environmental factors and personal characteristics.

Personality and functional parameters of the manager (activity and functions of the manager)

The analysis of the personal parameters of the manager is directly related to the particularly responsible functions that he has as a leading subjective factor of management. Presented successively by K. Alhov, they have the following form: setting and analysis of problems, setting goals, planning alternatives, solution; activation; organizing; coordination and management; motivation; controlling; evaluation.

These functions - despite the incompleteness and conditionality that they have, correspond directly to the main elements of the management process - planning, organizing, leadership, control, motivation, and therefore allow deriving and systematizing the leading personal parameters of the manager, their relationship and purpose. In its diversity and complexity of implementation management activity depends on a number of subjective and objective factors and conditions. Most directly and significantly, however, it is determined by managerial skill, managerial approach, tactics and strategy and management style. These basic personality-functional parameters play a decisive role in the effectiveness of management.

Managerial management skill - is a specific type of human skill, and the skill is to do something with the mind, ie with effort and intelligence. Its leading characteristic is the successful driving of human communities to achieve the common goal. It is proof that the manager has sufficient ability to carry out effective human interaction, which implies a number of qualities, traits and characteristics of his personality related to the functioning of relationships with others, their stimulation and motivation for greater activity.

The manager, as the head of the organization performs a variety of functions, but the main ones are related to goal setting and goal setting, organizing activities, leadership, motivating and stimulating people, control and evaluation, which require him to have certain personal qualities. The personal qualities of the manager are a key prerequisite for success in his work.

Managerial approach and style of the manager

The managerial skill of the manager is expressed in the approach, the strategy and the style of the managerial actions performed by him.

At the psychological level, the so-called atomistic and holistic approaches are presented. The atomistic is expressed in a careful concentration on the individual elements of the activity, without orientation in the general structure, which hinders its quality. The holistic approach is characterized by the desire to understand the general meaning and establish the links between the ideas of the manager, his intentions and the subjective personal meaning.

Close to these approaches are the two other approaches described: superficial and in-depth. The superficial approach includes more external to management, instrumental motives for activity. The main thing is to maintain a balance between the probability of failure and the favorable conditions for successful work. The in-depth approach covers in-depth motives, internal to the personality and activity of the manager. They reinforce the sense of personal competence and self-efficacy.

3 Helber, 1987, Quincas Borba

6 Nikova.(2007)., Problems of management psychology., University Publishing House, Sofia. p.57
Along with the above-mentioned superficial and thorough approach, the so-called approach to achievement (F. Marton). It includes motives for achievement, which are based on the principles of competitiveness and the need for self-improvement in management, as well as for achieving high results, regardless of the dominant common interest and existing conditions.

**Ability to make management decisions**

Decision-making is an extremely important part of the management activities of the organization. It can be said that decision-making is the "central axis" around which the life of the organization revolves. Making the right decision is inherently a management art. The solution is a choice of alternatives. The effect of the manager's managerial activity is related to his ability to see and solve problems, to identify the goals of the company's activity and, accordingly, the ways, means and means by which these goals will be achieved. This requires from the manager competence in outlining the strategy and tactics of the company, combined with creative imagination and intuition.

**Peculiarities in the personality structure of the leader.**

Analyzing the activity of the leader in an organization, we inevitably come to the problem of his individual personal characteristics and the need for self-knowledge. The first condition determining the effectiveness of the manager's work is the opportunity to get to know himself well and to evaluate his abilities. Everyone to a greater or lesser degree asks himself the question "Who am I?" For the leader, this focus and self-knowledge is mandatory. In order to be able to well manage the behavior of other people, to select the most appropriate strategies and approaches for influence, to be able to lead the activities in the organization to achieve the goals, he must realize his skills, qualities, peculiarities of his mental processes, states and properties. Individual personality traits relate to sensations, perceptions, thinking, memory, speech, emotions, feelings, will, temperament, abilities.

One of the most imposed in the psychological literature are the opinions of K. Platonov, K. Jung, H. Eisenk and others.

Another important concept in the theory of the study of the personality structure of the leader is the personality variable locus of control. The localization of control reflects the extent to which a person is perceived as the main source of causality in determining events. Individuals with internal control localization rely on themselves for success and realization in the work to a greater extent than persons with external control localization, who believe that the impact of external factors on success is decisive.

In fact, people who think they can control the stressful events in their lives are less upset by unpleasant but natural life events.

Today, more and more attention is paid to the interdependence between personality type, work activity, emotions and the experience of stress. The classification of the following types of personalities is known in the scientific literature:

- The type A personality is disposed of by its strong orientation towards competitiveness and achievement; from the heavy and personal acceptance of insults; from eternal haste and intolerance to delays and queues; from his hostility and aggression, his activity and cholericism, etc.
- Personality type B is phlegmatic, relaxed, lethargic, yielding, loving and philosophically justifiable to life, with relatively slow speech and movements and experiencing as having enough time for everything and everyone (Papancheva, Silgidjian).
- Personality type C is found among people whose behavior is characterized by anxiety - depressive attitude. They have difficulty expressing negative emotions that tend to contain emotions, especially resentment and anger.
- Personality type D is characterized by the formation of chronic stress. This type of person experiences an increased sense of anxiety, low self-esteem, tends to experience mostly negative emotions and does not feel able to cope with problems and daily stressful situations. Characteristic of them are the lack of social contacts, discomfort and restraint in communicating with others.

Alexithymic personality - the term alexithymia (meaning - without words for feelings, ie there is no verbalization of feelings) was introduced and developed by Peter Sifneos. This type of person finds it difficult to identify and describe his own feelings, it is difficult to distinguish between feelings and bodily complaints, he has a reduced ability to express his imagination. He is more focused on events than on inner experiences. He cannot formulate or express his emotions and psychological conflicts verbally. There is a hypothesis according to which the limited awareness of emotions and their cognitive processing leads to focusing of the somatic components in emotional arousal and their amplification.

Despite the autonomy of the manager over the way he fulfills his commitments, low levels of control over work are usually associated with high levels of stress. Low levels of trust and support are likely to increase stress. Stress levels are also affected by the way change is implemented, managed and communicated to staff, as unnecessary or poorly planned change leads to excessive pressure on workers. Stress is triggered when the manager does not have a clear understanding of his role within the organization, when there is a conflict between roles or ambiguity regarding the position and degree of responsibility to others. Support and training are also important. In the context of the stress of the leader's personality, Leon Levy points out five types of reasons for the appearance of mental stressors: The first common cause is the increasing wear and tear of the individual, which is firmly fixed in the environment. It refers to the requirements and capabilities on the one hand, and the abilities and needs of the individual, on the other. If the environment places greater demands on the individual than...
he or she can fulfill, the force of stress increases, and with it the wear and tear in question. Similar effects occur with overload or underload.

Another reason is the relationship between expectations and reality. When an individual's expectations remain vain and unfulfilled, he is dissatisfied and falls into a state of stress. Often, however, human ideas are unreal, which naturally leads to inevitable disappointment. In other cases, expectations and desires are real and reasonable, but there are obstacles to satisfying them. In both cases, the risk of stress increases.

The third reason covers conflicts in the performance of various roles of a leading leader who has another leader over him; of children; of parents; of spouses, etc. Ultimately, these conflicts can lead to deepening mental stress and possible mental and psychosomatic disorders.

The fourth reason lies in the inability to engage in collective work and integration into the community, in order to fully interact with the environment, ie to adapt to it.

The last, fifth reason stems from the environment - the placement of the individual in conditions of excessive or insufficient stimulation. Too much or too little is always harmful and leads to stress.

Ethical dilemmas can also put the leader's personality in front of a choice between informed consent or confidentiality. Additional ethical decision-making may involve personal and professional conflicts.

Stress prevention
Stress management is traditionally considered on two levels. At the individual level, it includes coping strategies that individuals apply to stress at work, and at the organizational level, approaches and techniques for stress prevention and interventions to reduce the negative effects on efficiency and health. The first is aimed primarily at organizational factors that cause stress, and accordingly aims to reduce the harmful consequences such as declining efficiency, increasing delays and absenteeism and turnover. In this case, the attempts to preventively reduce the objective preconditions for stress are crucial, while improving communication and creating supportive social relations and team spirit. The other approach is designed to help employees through appropriate training to learn about the causes of stress, its manifestations and symptoms, so that they can build adequate personal strategies and ways to overcome the negative effects of stress and maintain their ability to work and health. The two approaches are interrelated. Creating and implementing training programs in the organization that increase personal understanding of stress and how to respond to stressful situations is just one of the most common areas of work that work and organizational psychologists can take to reduce harmful effects of stress on the individual and the organization.

One of the most influential concepts of coping with stress is that of Folkman and Lazarus, who reduce coping to constantly changing cognitive and behavioral efforts to control the environment, the impact of which tests the personality and exceeds its resources. According to them, the emotions and coping provoked by stressful events are due to knowledge related to the way a person perceives his relationship with the environment. The coping process has several moments. First of all, the assessment of the damage or loss resulting from a stressful event is an important determinant of coping. Second, the assessment of the degree of stress control is a factor in choosing a coping strategy. The third component is the personal assessment of the probable outcome of the situation based on the efforts made, as well as the expectations for future success in dealing with the stressful event. These judgments guide the individual in choosing a coping strategy. In addition, they determine the psychological adaptation to the situation.

Intellectual potential of the leader.
Thinking
When considering the thinking of the leader, the qualities of the individual thought process occupy an important place. In each person these qualities are in a different ratio, which determines the different approaches in solving one or another problem.

Innovation is a new type of thinking that implies high goals and high criteria, anticipating ideas and methods for rapid implementation of new technologies, rapid receptivity to everything new, building new hypotheses, rapid insight into new promising technologies and more.

Imagination The element of imagination is essential for the leader and comes first, because without it we are deprived of purpose and aspiration. Imagination belongs to the highest cognitive processes. Its role is that it allows predicting, to see as an image the expected result. It is the result of conscious human activity.

Intuition is a subconscious mental process that arises on the basis of previously realized phenomena. It is a quality of personality that combines genetic and social characteristics and is expressed in the way decisions are made (sometimes impulsively, unconsciously, guided by some inner voice), a flash of ideas, willingness to take risks, sharpening the senses, specific pulse, voltage, etc.

Knowledge, skills and qualities of the leader
All over the world, the modern manager is perceived as a leader-innovator. Therefore, the main claims are to the volume and quality of his knowledge. The modern manager must have in-depth knowledge in the areas shown in the figure below, which must be constantly updated and updated.11

As especially significant personal qualities of the managers we can include:12
- Passion for knowledge, professionalism and creative approach in work;
- Perseverance, self-confidence (in the good sense of the word) and dedication;
- Inventiveness, initiative and ability to generate ideas;
- Communicativeness;
- Ambitions in pursuit of success;


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• Emotional stability and stress resistance;
• Openness, flexibility and adaptability to change;
• Responsibility for work and decisions
• Ability to create cohesive, working teams;

• Ability to quickly and efficiently solve emerging problems;
• Need to work in a team and with a team;

### Table 1. Knowledge of the Manager

<table>
<thead>
<tr>
<th>Object of Management</th>
<th>Management Methods</th>
<th>Strategy, Policy</th>
<th>Outdoors</th>
<th>Partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>The organization as a system</td>
<td>Organizational and administrative methods</td>
<td>Mission, goals and tasks of the organization</td>
<td>Economic component</td>
<td>Other organizations</td>
</tr>
<tr>
<td>Organizational structures and their development</td>
<td>Economically Efficient methods</td>
<td>Types of strategies</td>
<td>Politically</td>
<td>Economic partners</td>
</tr>
<tr>
<td>Functional areas of the organization</td>
<td>Socio-psychological methods</td>
<td>Strategic planning</td>
<td>Eco-demographic</td>
<td>Providers</td>
</tr>
<tr>
<td>production, innovation</td>
<td>Methods for motivating human resources</td>
<td>The way to develop strategies</td>
<td>Technical</td>
<td>Subcontractors</td>
</tr>
<tr>
<td>Human resources and their motivation</td>
<td>Methods for preparation and decision making</td>
<td>Implementation of strategies</td>
<td>and technological</td>
<td>Consumers</td>
</tr>
<tr>
<td>Organizational culture</td>
<td></td>
<td>Market consumers, competitors, market organization position;</td>
<td>Ecological</td>
<td>Banks</td>
</tr>
<tr>
<td>Organizational behavior</td>
<td></td>
<td></td>
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<td>Institutions</td>
</tr>
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</table>

**Organization, economy in the use of time.**

Technical skills related to special or professional knowledge. Technical skills in areas such as production organization or accountability require analytical skills.

**Communication skills.**

They allow the person to work in a team and to mobilize joint efforts, directing them to effectively achieve common goals.

**Conceptual skills.**

They are expressed in the ability to assess the general situation. This type of skills allows to take into account the interdependencies of the different parts of the organizational structure and to understand how changes in one part will cause changes in another. Skills of this type are needed to reveal the interrelationship of economic activity and the public in different economic, political and social environments.

According to many authors, leadership skills refer to: leadership skills, planning and organizing skills, communication skills, interpersonal skills, presentation skills, self-defense skills, and more.

**Professional qualities of the leader**

Analyzing the personality of the leader, we inevitably ask ourselves the question: what characterizes his personality, what distinguishes him from other people and what are the qualities that determine the effectiveness of management, his ability to organize and manage.

The first quality that can describe the personality of the leader is activity and willingness to act in conditions of uncertainty. The situation with COVID-19 in Bulgaria and the world has led to economic instability and great uncertainty. The dynamics of these processes requires from the manager appropriate reactions expressed in a change of way of thinking and forms of behavior.

Change is a fundamental quality of a leader's personality. You can't talk about any change without activity. All people involved in business and its management point out that success is associated first with activity. This is a specific personality trait, which is expressed on the one hand in the ability to accurately analyze, calculate, predict, etc., and on the other hand is associated with the willingness to act without always guaranteeing the result. Undisputed is the fact substantiated in psychology that needs, motives and interests form the energy of action, manifested in activity, perseverance in seeking solutions and achieving goals.

An important psychological prerequisite in the work of the leader is the motivation for achievement. In a broad sense, the motivation for achievement is an established stereotype, a willingness to react, which depends on the object and group norms. In a narrower sense, it is the set of needs and motives for action that can be more or less successful and that provide information about one's own capabilities. The image of a person with high motivation for achievement is usually associated with authority, competence, aggression, striving for dominance.

The activity of the manager is also associated with his level of claims. The problem of the level of claims of the individual can be considered in three directions.

Level of claims with the experience of success and failure - success leads to an increase in the level of claims, and failure to their reduction. The set of claims varying in each achievement is a claim level.

The second direction examines the relationship between the level of claims and the goal. Research shows that the level of pretensions is an element of the motivational
The structure of the personality as a need for achievement and affects it.

The third direction examines the relationship between the level of claims and self-esteem. It is concluded that one of the components on which the level of claims is built is self-esteem. At the same time, the level of claims depends on self-esteem. Therefore, their relationship is two-way, they influence each other. High self-esteem determines a higher level of claims. Satisfaction at this level, in turn, implies even higher self-esteem.

Another quality that characterizes the personality of the leader is purposefulness. In management, the goal is extremely important. With regard to the organization, the goal gives the direction of the activity and helps in the planning process. Personally, the goal fills a basic need for man, gives meaning to life. Successful people always set goals.

Management activity requires from the manager a number of other qualities such as: confidence, competence, organization, determination and perseverance, uncompromisingness, independence, etc. In general, the necessary qualities of the leader can be combined into three groups: individual, professional and managerial.

INDIVIDUAL: Personal charm, adaptability, psychological experience, intellect and erudition, creative thinking, resourcefulness and resourcefulness, foresight, good memory, distribution and flexibility of attention, initiative and independence, determination and courage, self-confidence;

PROFESSIONAL: Professional knowledge and competence, business acumen, ambition, creativity, sense of responsibility;

MANAGEMENT: Decision making and enforcement skills, caring for people, aggression, loyalty, persuasiveness, management skills, communication skills, accessibility, fairness, organization, organizational experience, leadership, collectivity.


The main social attitude in the organization is the relationship between the leader and his subordinates. The relations that are created between them are status, subordinated to the hierarchical relations. The leader has formal and informal power, which has the opportunity to influence and influence his subordinates. Subordinates also have power. They can form groups, which gives them collective strength, because the manager could not fire everyone, they can even make him dependent through his behavior and the results of his work.

The relationship between a manager and subordinates is carried out mainly on the initiative of the manager. He gives instructions for the work performed, makes suggestions on how to carry out the tasks, discusses the results obtained, controls, sanctions. Subordinates can also take initiatives. They are expected to seek help, advice, but observations show that they are more likely to refrain from doing so. They prefer to address their peers because of the likelihood that they will be judged incompetent. Subordinates' initiatives relate to seeking specific orders or instructions, sharing progress, making suggestions or complaints. Because the relationship between manager and subordinate is status, mostly formal, it is unequal and can be both a source of satisfaction and of conflict and hostility.

Conflict is mainly associated with the power that the leader has and the expectation to direct maximum efforts to achieve the goals of the organization. He distributes tasks, punishes, sanctions, controls, rewards, raises.

On the other hand, a manager and subordinates can establish very satisfying relationships. It turns out that job satisfaction, turnover, are strongly influenced by the relationship with the leader, by his qualities and skills. Managers can be a source of social support for their subordinates, expressed in the search for intervention on both issues directly related to work and personal issues. This effect on their physical and mental health reduces the level of stress.

In order to build a satisfying relationship with their subordinates, managers should focus mainly on the following areas: planning work for efficiency, setting clear goals, giving instructions, preparing, checking, making adjustments, motivating subordinates; care for the interests and needs of subordinates, solving interpersonal problems in the group, democratic, belief-based work style; improving communication in order to create and maintain good relationships.

Performance and evaluation methods

Work performance is an important criterion for organizational results and success. Labor performance is the performance and completion of a certain job, "qualitative and quantitative expression of the received, as a result of purposeful and planned activity; 'Carrying out or completing the work, taking into account the volume, nature, time and costs incurred. Assessment contributes to the formation and development of personality. Educates criticism of one's own weaknesses, but must also show the way to overcome them; it must be presented in such a way as to make the evaluated want to make efforts to overcome the weaknesses. The methods and techniques used for analysis and evaluation are comparative and individual. Comparative methods include staff ranking (ranking employees from best to worst), pairwise comparison (comparing one employee to each other in the group), and imposed distributions (allocating employees by established categories). Individual methods for performance evaluation are related to the evaluation of the employee on the basis of his own qualities and achievements, without comparison with other employees.

Graphic rating scales are predefined scales for evaluation of employees, which contain important elements for the work such as the quality of the performed activity and obligatory organizational procedures. Behavioral rating scales use labels that identify behavior as weak, medium, and good, while behavioral rating scales monitor how often key and difficult behaviors are performed. The to-do lists consist of statements derived from the performance analysis that reflect the positive and negative aspects of performance.

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Critical incident technique

Managers prepare a list of allegations of very effective and ineffective employee behavior. These critical incidents or events represent inappropriate or bad behaviors and actions of employees. Managers maintain a file for each employee, which periodically records critical incidents and their behavior. At the end of the evaluation period, these dossiers are used to evaluate individual performance.

Questionnaires / Checklists

The questionnaires represent a large number of statements about the specifics of a particular job, and each statement has a certain weight or rating on the scale. The evaluator marks the statement that best describes the individual's behavior. These questionnaires are designed by professionals who know in detail the work processes for each position. The allegations are categorized by evaluators and the weight of the allegations is determined again by them.

The variety of perspectives makes it possible to identify the employee's contribution to the organization, as well as to identify areas for improvement that need to be addressed.

III. STUDY OF STRESS AND ITS IMPACT ON WORK PERFORMANCE

The purpose of this study is to examine how stress and prevention affect the work performance of the manager in the company LILIA 86.

The monitoring method and the Questionnaire were used to measure the effects of stress. The respondent is offered 18 statements that reflect the most commonly used ways to deal with stressful situations in the workplace. The questionnaire includes three subscales that measure the three aspects of stress. The Emotional Exhaustion Scale measures the experiences of emotional exhaustion and exhaustion caused by work. The depersonalization subscale establishes insensitivity and impersonal reaction to recipients of service, care, or information. The Achievement and Performance Subscale evaluates a sense of competence and successful performance in working with people.

The data shows a generally good reliability of the instrument in the current study - α = 0.743. For all subscales the reliability is above α = 0.7. For depersonalization it is good - α = 0.779, and for emotional exhaustion (α = 0.819) and performance and performance (α = 0.832) is very good.

Evaluation of work performance is an important factor that affects organizational results. The leader's self-assessment plays a key role in evaluating the performance and helps to improve it. In this regard, a scale is used which shows the extent to which each of the following statements relates to the performance of the manager.

<table>
<thead>
<tr>
<th>Table 2: Rating scale</th>
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<td>Never</td>
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It is clear from the evaluation scale that the manager evaluates himself as creative, innovative and dedicated to his work. You need to pay more attention to the development of your professional competencies, as participation is training and seminars.

From the analysis of the influence of stress on the work of the manager by criteria such as: rest, entertainment, emotional response, etc., we summarized that entertainment proves to be crucial for better job performance of the manager and have a positive impact on the components of development and enhancement of professional competencies. To the greatest extent this technique determines the competencies for working with users (β = 0.153; p = 0.000) and performance standards (β = 0.148; p = 0.001) and to a lesser extent organizational skills and competencies (β = 0.104; p = 0.016), teamwork skills (β = 0.094; p = 0.032).

CONCLUSION

Knowing the basic models and concepts of both managerial styles and management decision-making styles would allow each manager, on the one hand, to define and understand their own, preferred style of behavior with its strengths and weaknesses, and on the other hand, to gain an overview of the different styles, see them from different points of view, better understand their advantages and be able to properly assess in which situations it is appropriate to use them. In this way, a flexible, adaptive management style could be built and maintained, which would allow the development of the strong and valuable traits of the manager's personality and at the same time be tailored to the specifics of each specific task and situation. The whole theory finds application in the development of competency models and most organizations use them for the development of management staff. The effect of water management is not related to the skillful execution of water funnels. actions - planning, organization, motivation and control. Modern business, characterized by an increasing number of young people and postmen Jan transformation requires entrepreneurship, but creative decisions. As a leader in the work of the leader, his skills to outline are outlined. This is the company's development strategy and the way in which it can be implemented you will not; to help you read from your needs, interests and disclosures in the first place for development; to influence, to escape, to seek understanding, to agree, to act; to exercise managerial interventions in the conditions of competition.

A study conducted by the manager at LILIA 86 found that, in general, stress affects the development and enhancement of professional competencies and the work process.

Table 3. Questionnaire filled by managers

<table>
<thead>
<tr>
<th>N</th>
<th>Question</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Usually</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I know and apply the professional standards, ethics, principles and values of the humane social work.</td>
<td></td>
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<td>5</td>
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<tr>
<td>2.</td>
<td>I know, respect and protect the rights of the consumer.</td>
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<tr>
<td>3.</td>
<td>I can take a complete social history and prepare complete and accurate needs assessment.</td>
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<tr>
<td>4.</td>
<td>I prepare and / or work on an individual plan for work with the user, being able to set specific and realistic goals, as well as specific activities for achieving them.</td>
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<td>5.</td>
<td>I can identify the risks for the user and I apply tools to minimize them.</td>
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<td>6.</td>
<td>I know and apply the methods of &quot;case management&quot;, crisis intervention, informing the local community.</td>
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<tr>
<td>7.</td>
<td>I can develop and lead programmes for group work</td>
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<td>8.</td>
<td>I fulfill the duties described in my job characteristic.</td>
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<tr>
<td>9.</td>
<td>I develop my professional competencies through participation in trainings, seminars, etc. forums.</td>
<td></td>
<td></td>
<td></td>
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<td>3</td>
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<tr>
<td>10.</td>
<td>I make systematic efforts for extra self-preparation adapted to the latest trends and to implement them in practice .</td>
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<tr>
<td>11.</td>
<td>I show creativity, innovation, initiative.</td>
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<tr>
<td>12.</td>
<td>I have an inner motivation and attitude towards work: dedication, striving for development, setting personal goals and working to achieve them.</td>
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<tr>
<td>13.</td>
<td>I know the work of the other members of the team and I take on their tasks when the work requires it / if it is applicable.</td>
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<tr>
<td>14.</td>
<td>I have a personal contribution to achieving the goals of the team.</td>
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<tr>
<td>15.</td>
<td>I prepare a monthly / weekly plan for my work and a report on its implementation, which give a specific information about my performance.</td>
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<td>16.</td>
<td>I observe labor discipline and work rules.</td>
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<tr>
<td>17.</td>
<td>I plan tasks by urgency and importance.</td>
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<tr>
<td>18.</td>
<td>I adapt flexibly to changes in work.</td>
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<tr>
<td>19.</td>
<td>I strive to constantly develop and improve the skills necessary for the successful implementation of work.</td>
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<tr>
<td>20.</td>
<td>I think that the evaluation of my work performance is objective and impartial.</td>
<td></td>
<td></td>
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<td></td>
<td>5</td>
</tr>
</tbody>
</table>

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The economic influence of industrial control systems in the energy and transport sectors

Vladimir Zinoviev

Abstract — The Industrial Control Systems (ICS) are structure and designed to automate and control defined processes and / or technical facilities, including components as Supervisory Control and Data Acquisition (SCADA) systems, Energy Management Systems (EMS), Distribution Control Systems (DCS), or Process Control Systems (PCS).

Keywords: management of Industrial Control Systems, Supervisory Control and Data Acquisition

JEL: F16

The Industrial Control Systems (ICS) are structure and designed to automate and control defined processes and / or technical facilities, including components as Supervisory Control and Data Acquisition (SCADA) systems, Energy Management Systems (EMS), Distribution Control Systems (DCS), or Process Control Systems (PCS). On the other hand, we could consider that the energy and transport systems are an integral part from the overall security system. In this line the vulnerability of the critical infrastructure could be accepted as an element with high level of significance. (Lazarov, 2019a, 2019b).

For the utility companies the sustainability of the corporate IT infrastructure is critical related to the SCADA system and the energy automation platform in general. The cyber security penetration in these systems could cause loss of service to the customers for many hours. That kind of intrusions might be a reason for interruption in the regular work of the relevant IT-systems causing replacement, rebooting or restoring. These processes are more and more related to virtualization and cloud-based architecture. The SCADA for example is in charge for physical processes management which is directly leading to consequences in real infrastructure operation and maintenance. Most of the rapid response reactions in such situations are crucial.

The SCADA systems are used to control and monitor processes not only related to transmitting electricity, but also to transport of oil and gas infrastructure, public electrical transport, environmental facilities such as heat and water supply, water and waste water treatment plants and many more.

The communication infrastructure is connecting the hypervisor system to the Remote Terminal Units. The Human-Machine Interface plays a significant role in this approach providing relevant information to a human operator. The Remote Terminal Units (RTUs) are connecting to the sensors at the system, transferring signals to digital data and sending digital data to the supervisory system. Based on this the human operator is able to supervise and controls the process. The system is providing overview, acquiring data on the process and forwarding commands to the running programs. As part of this complex functionality the Programmable Logic Controller (PLCs) are most frequently installed because of their economical, agile, and configurable characteristic.

Due to the need for installed systems to enhance situational awareness for industrial control systems especially in the energy and transport sectors there is a further need for improved cyber security on integrated approach. As a follow-up of this process it becomes possible to improve the quality of operating the power system facilities. On this basis the operators could recover system failures and malfunctions faster and more reliable. The operators are able to react to emergencies and recovery process in shortest time-frame, in order to keep high level of capacity of the power system.

The created over the ICS environment solutions develop the capabilities which allow them to execute difficult algorithms that could prevent operational damage or malfunction.

Due to the economic influence, and direct effect on civilian lives and infrastructure, the oil and gas industry has a high risk for ICS-targeted interaction. The reason for that could be a cyber attack or other security risks.

For that purpose it is a priority to assess the industrial controls systems interface especially due to the economic impact in strategic sectors like energy (oil and gas, power generation, energy transmitting and distribution, and many more) and transport.

The cyber security approach, especially regarding energy and transport, could play a crucial role for the economic sustainability not only of the critical infrastructure, but also to the related segments. In the last 10 years this landscape has rapidly changed, presenting a future in which the unpredictability could become a daily reality. The automated processes supervised via industrial control systems can easily be transformed from strength into a weakness. Clearly, these are times that call for smarter control systems. However it is the job of the experts to

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reorganize it and to continue its further improvement and strengthening its capacity.

The industrial control systems are not the ultimate solution for the energy and transport sectors from the economic point of view. It takes a lot of efforts to evaluate the best algorithm of functionality in order to achieve maximum productivity on one side and secured sustainability on the other. The cooperative approach between the different stakeholders is critical for the next generation of operational productivity in the context of industry 4.0. The experienced professionals from the energy and transport sectors in their conservative understanding of the core business environment need to reconsider the potential of the new solutions and technologies provided by the modern ICS.

For the energy and transport companies the main task is not any longer just to get the job done. It takes much more focus on the responsible and responsive control. Relying on the long-term implementation and operation of the ICS-solutions and the related to them tools and technologies, the puzzle becomes more and more clear. The energy and transport companies will be able to overview and control what’s going on in the system more completely and more frequently than it was possible in the past. This approach enables additional levels of control and increased productivity of the available assets.

As a basis and in the shorter term, a sophisticated integration of an ICS offers operational advantages like reduced losses, distant management, improved processes, workforce efficiency and many more. In addition to all this, the industrial control system contributes to the improved asset management, including system planning and better capital asset utilization. The ICS is increasing the utilization and operational capacity of existing technical legacy. It incorporates higher level of integration, reduces carbon emissions by increasing the systems profile. The industrial control systems add functionality to the energy intensity and improved power quality in order to cover the new digital demands. During this process the highest levels of security requirements are becoming a strategic goal - even more, the ability of an energy or transport company to build a smarter functionality is looked upon far more favorably by the financial organizations.

In combination with the existing legacy solutions the ICS could additionally strengthen the operative functionality of the energy and transport companies, increasing their operational flexibility and significantly reducing the risk of a failure that might affect the entire legal entity.

![Fig.1, SCADA solution](image)
The pictures are showing the visualization of different SCADA solutions, managing processes and providing real-time monitoring.

The successful implementation of an integrated automation process is a common result of two directions – control engineering and the control system:

The control engineering is based on the foundations of feedback theory and linear system analysis, and it generates the concepts of network theory and communication theory. Accordingly, control engineering is not limited to any engineering discipline but is applicable to aeronautical, chemical, mechanical, environmental, civil, and electrical engineering.

The control system is an interconnection of components forming a system configuration that will provide a desired system response. The basis for analysis of a system is the foundation provided by linear system, which assumes a cause-effect relationship for the components of a system.

The ICS design is including the following development phases:
1. Establishment of control focus
2. Identifying the variables related to the control process
3. Defining the specifications for the variables
4. Structuring the system configuration and identifications
5. Elaborating the model of the process including the sensors
6. Defining the controller and the main parameters to be controlled
7. Optimization of the system parameters and analysis

The main elements of the system include the DC amplifier, the motors, the control device, the actuator and the sensors.

The role of air traffic control systems is increasing as airplane traffic increases at busy airports. Engineers are developing air traffic control systems and collision avoidance systems using the Global Positioning System (GPS) navigation satellites. GPS allows each aircraft to know its position in the airspace landing corridor very precisely. Sketch a block diagram depicting how an air traffic controller might utilize GPS for aircraft collision avoidance.

The potential of employing two or more helicopters for transporting payloads that are too heavy for a single helicopter is a well-addressed issue in the civil and military rotorcraft design arenas. A case of a multi lift arrangement wherein two helicopters jointly transport payloads has been named twin lift as shown in the following figure. Develop the block diagram describing the pilots’ action, the position of each helicopter, and the position of the load.

Many cars are fitted with cruise control that, at the press of a button, automatically maintains a set speed. In this way, the driver can cruise at a speed limit or economic speed without continually checking the speed meter. Design a feedback control in block diagram for a cruise control system.

The understanding of dynamic system challenges can be structured in the following way:
- Defining the system and the belonging element
- Defining the mathematical approach and the requested assumptions.
- Write the differential equations describing the model.
- Solving the equations regarding the foreseen variables.
- Testing the possibilities and the assumptions.
- Evaluation and / or redesign the system if requested.
Regarding the design of controllers utilizing state feedback there are two critical topics to be evaluated: Control and oversight of the procedure for determining an optimal control system. The relevant formula can be used to define the state variable feedback gain matrix to place the system poles at the desired locations. The system pole locations can be agile placed if and only if the system is running. When the full state is not available for feedback, we utilize an observer. The state variable compensator is obtained by connecting the full-state feedback to the observer. The optimal control system design is defined and then the use of internal model design to achieve prescribed steady-state response to selected input commands is implemented:

- The described design approach is focused on the pole-location method and the quadratic optimal regulator method. The pole-location method is like the root-locus method - closed-loop poles are placed at desired locations.
- The state variable feedback may be used to achieve the desired pole locations of the closed-loop transfer function.
- The approach is based on the feedback of all the state variables, and therefore \( u = Kx \).
- When using this state variable feedback, the roots of the characteristic equation are placed where the transient performance meets the desired response.

The concept of controllability was introduced by Kalman in 1960 and they continue to play an important role in the design of control systems in state space. The conditions of controllability oversight the solutions to the control system design problem. The solutions of the case may not be implemented if the system is not controllable.

Over the time, some or all the scalar time functions can be arbitrarily large in scalability. Another method of determining whether a system is controllable is to draw the state variable flow diagram and determine whether the control signal, \( u \), has a path to each state variable. If a path to each state exists, the system may be controllable.

Uncontrollable system has a subsystem that is physically disconnected from the input. For a partially controllable system, if the uncontrollable modes are stable and the unstable modes are controllable, the system is considered stable. The stable mode that corresponds to the eigenvalue of \(-1\) is not controllable. The unstable mode that corresponds to the eigenvalue of \(1\) is controllable. Such a system can be implemented stable using a suitable response. In that way the system is stabilizable.

All the roots of the characteristic equation can be placed where desired in the s-plane if, and only if, a system is controllable.

Observability refers to the ability to estimate a state variable. On this basis a system may be observable if the output has a component due to each state variable - considering the single-input, single-output system.

In this way the process of implementation of industrial control systems plays a significant role both for the development of the energy and transport sectors, transforming them in order to respond to the challenges of the new century. From strategical point of view, it is important to follow the structured approach during the implementation of the appropriate solution. Most of the vendors and solution providers present different technical process automation strategies depending on the legacy of the existing basis. This is also a pragmatic way to protect better the national critical infrastructure.
Fig. 7, Distributed control system of Yokogawa

Fig. 8, Transport industrial control system

Fig. 9, Example of integration of the Internet of things and Industry control systems

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The economic impact of implementing sustainable cyber security solutions in the energy / transport sector

Vladimir Zinoviev

Abstract — The smart grid security features are critical to maintain the stable and reliable operation of the power system during emergencies due to the failure of any critical component of the power system. Securing an intelligent network involves a lesser likelihood of a power failure or equipment failure.

Keywords: cyber security solutions, energy and transport sectors

JEL: F16

The smart grid security features are critical to maintain the stable and reliable operation of the power system during emergencies due to the failure of any critical component of the power system. Securing an intelligent network involves a lesser likelihood of a power failure or equipment failure. On the other hand, the energy and transport systems are an important and integral part of the overall security system. In this context the defense of the critical infrastructure becomes priority and significant element of the national policy (Lazarov, 2019a, 2019b).

In the absence of adequate security measures, significant shutdowns may occur, which can even lead to a worsening crash. Therefore, in order to protect this critical infrastructure of the energy system and to ensure reliable and uninterrupted power supply to end users, smart grid security issues must be addressed with the highest priority.

In the smart grid area, the electrical power infrastructure is being modernized by implementing electricity requirements and advanced functionality for its customers. When building the smart grid, the cyber system is integrated into the physical power system. Although the deployment of smart grids makes the network more energy efficient and modernized, there are crucial segments with potential cyber attacks that appear. They are critical to the infrastructure security and customer satisfaction. Due to cyber attack, the power grid can face operational crashes and loss of synchronization. This operational deficit can damage critical components of the power system that can interrupt the power supply and cause the system to become unstable.

Cyber attacks over intelligent energy systems - in recent years, the energy system has faced several cyber-related attacks that have raised the issue regarding security vulnerabilities and their large-scale impact on critical power infrastructure. In the smart grid, the physical power system and the cyber system of information and communication technology are highly interconnected, leading to new security concerns. Intelligent network security problems need to be addressed with the new challenges of reliable, safe, efficient and stable network operation. It is important to note that current security approaches are in their main part incompatible, inapplicable or not viable, insufficiently scalable or simply inadequate. This implies the need to replace them with newly or sophisticated techniques to ensure the security of the extremely comprehensive and complex dynamic environment of an intelligent network. This is part of the agile solution approach.

The smart grid cyber security requirements are different from other critical infrastructures. In recent years, the vulnerabilities of the smart grid have increased many times due to the widespread adoption of the communication network at different levels of work when designing the development of the transmission network. Protecting the smart grid is as important as protecting the physical network from three broad classes of cyber attacks:

• Protection against component cyber attack
• Protection against cyber attacks that is consistent with the topology
• The security issue for the future smart grid

To protect the smart grid at the device or component level, a security agent framework has been created, offered in security formats. It must be installed both in field devices and at the substation level. This process plays a significant role also from the economic point of view. Some of the key functions of security agents described in smart device security at the integration or component level is to create a framework based on the security agent proposed in security formats to be deployed in both field devices and in substation level.

The smart grid is also vulnerable to topological cyber attacks. For example, based on the knowledge of the power system topologies, an attacker can break through the basic power detection algorithms in public systems. Another topology-based cyber attack is where an attack against an electrical switch would isolate the generating blocks from the electrical grid. This proves that a cyber attack against architecture with appropriate topological knowledge can lead to an attack for complexity and availability. Therefore, a security-based information flow model is proposed to

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mitigate these security issues. In an optimal vision for deploying links against accidental attacks on the cyber-physical network, it is shown that the strategy also provides better security than any other possible approach, including strategies using random distribution, one-way connections, when the cyber topology and the physical network are unknown to one another.

Significant initiatives are being undertaken around the world to make the grid operation smarter. These measures are not only intended to help modernize the grid itself, but also to improve overall efficiency, sustainability and satisfactory reliability. But security concerns must be maintained to ensure uninterrupted power supply to end users and to protect the public electricity grid from terrorist attacks. It is important to mention that in a properly developed cyber defense framework, all aspects of the cybereconomy should be addressed to the physical infrastructure of the electricity grid.

This means that not only targeted cyber attacks should be considered, but also unwanted ICT-related anomalies, such as human operator errors, software errors, equipment failures and obvious natural disaster issues, should also be addressed. In the process of improvement of the electricity transmission network, more automated control of the network is introduced. The risk of intended cyber attack may increase as the network becomes more automated. Special control centers are the main target of cyber terrorists. Energy utility companies are implementing state-of-the-art security protocols as a means of counteraction.

In recent years, the number of cyber attacks has increased dramatically. Intelligent cyber terrorists with details and sophisticated knowledge of the energy system may be able to create or provoke a confidential attack on the network. Protecting the energy transmission and distribution network from cyber attack is not only a problem for utility engineers, researchers, and operators. It is also the responsibility of the public sector to ensure the security of this strategically critical infrastructure.

Key requirements for smart grid security include accessibility, integrity and confidentiality. Based on existing research, a review of smart grid anomalies is thoroughly discussed. The intelligent network security framework against component, protocol, and topological cyber attacks is evolving. Cyber security is highly important for the reliable and secure operation of critical intelligent network infrastructure. At present, mainly bad data detection (BDD) algorithms are used for data security in status assessment. However, a hacker can attack the cyber-physical network through any access point of the cyber-system and thus directly affect the physical assets. For increased reliability of the smart grid and security,
invasion detection algorithms must be installed throughout the system.

It is important to analyze the US Department of Energy focus on the areas of interest through the security projects:

Topic Area 1: “Detect Adversarial Manipulation of Energy Delivery Systems Components” – The focus is the ability to detect and respond to cyberattacks designed to avoid detection by exploiting routine operations normally performed by energy delivery systems.

Topic Area 2: “Secure Integration of Renewable Energy and Energy Efficiency Resources” – The focus is on making the integration of renewables onto the power grid at the generation, transmission and/or distribution levels more secure from cyber attacks. This may include the nexus of building control systems or plug-in hybrid vehicles with the power grid.

Topic Area 3: “Continual and Autonomous Reduction of Cyber Attack Surface for Energy Delivery Control Systems” – The focus is on reducing exposures of energy delivery systems to cyber attacks, thereby making the systems more secure.

Topic Area 4: “Supply Chain Cybersecurity for Energy Delivery Systems” – The focus is on detecting hostile hardware, firmware (combination of hardware and software), and/or software introduced at some point during the manufacture of energy delivery systems.

Topic Area 5: “Innovative Technologies That Enhance Cybersecurity in the Energy Sector” – The focus will be on identifying gaps in the Roadmap to Achieve Energy Delivery Systems Cybersecurity and proposing innovative technical solutions to the identified risk.

This overview is a good example that the potential cyber security risk in the energy and transport sectors is further considered as priority due to economic impact and the negative consequences. Therefore the public and the private sectors worldwide are encouraged to further work intensive on strengthening the capacity of cyber security in the sectors energy and transport.

Fig.2, Architecture model of cyber security
Fig. 3. Cyber security framework in the energy sector based on IoT.

Fig. 4. Investigating cyber security event.

Fig. 5. Investigating cyber security event.
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