

AN ANALYSIS MODEL OF THE COMMUNICATION FEATURES IN RESEARCH PROJECT MANAGEMENT

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Abstract

The communication process within project management is the main element which contributes to the successful completion of a project. In this paper we created a model of analyzing and interpreting the characteristics of the communication process. The CAP model, as we named it, is a useful tool for improving communication methods in research projects within different scientific research organizations. With the help of this model we can interpret certain communication features that are specific to the communication process in research projects.

Keywords: project management, communication, modelling, research

JEL classification: C11, C15, M14

1. Introduction

Within an organisation, communication is the process which insures information exchange from the top management to the middle and lower management, from management to personnel and vice versa. The communication process involves not only internal communication (between members of the same organisation) but also external communication (between

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members of different organisations). The basic communication model includes the following components: a sender, a receiver, a message and a channel. Following the transmission of a message through a channel to the receiver, feedback should be provided, so that the sender knows that the message has been decoded. Another component of the communication model is the noise. Noise can be defined as any environmental distraction that may influence the receiver's understanding of the message (Dow W.; Taylor B. 2008). Usually, the communication process in an organisation is part of the more complex management process of the organisation. Most of the organisations today, whether they are research focused or focused on technical developments, use projects in their endeavours. These projects usually face different communication problems. Communication in projects can be divided in internal communication and external communication. This paper focuses on internal communication, meaning the communication between the manager and the team and also between team members. The role of the project manager in communications is to be a facilitator. This means that he has to make sure that the message is sent, delivered and understood to the possible degree.

Since managing projects is regarded as being an endeavour with high expectations, communication within projects is crucial. Most of the research projects are carried out in order to prove one or more hypothesis, so team members have to share opinions and communicate them in order to prove them right or wrong. Another important feature of the communication process in project management is timing. The same as in our daily small projects, knowing the message that needs to be conveyed at the right time is extremely important. However clearly the message is, if delivered at an impromptu time it may have no effect at all or maybe it may have exactly the opposite effect.

2. Communication in project management and how to measure it

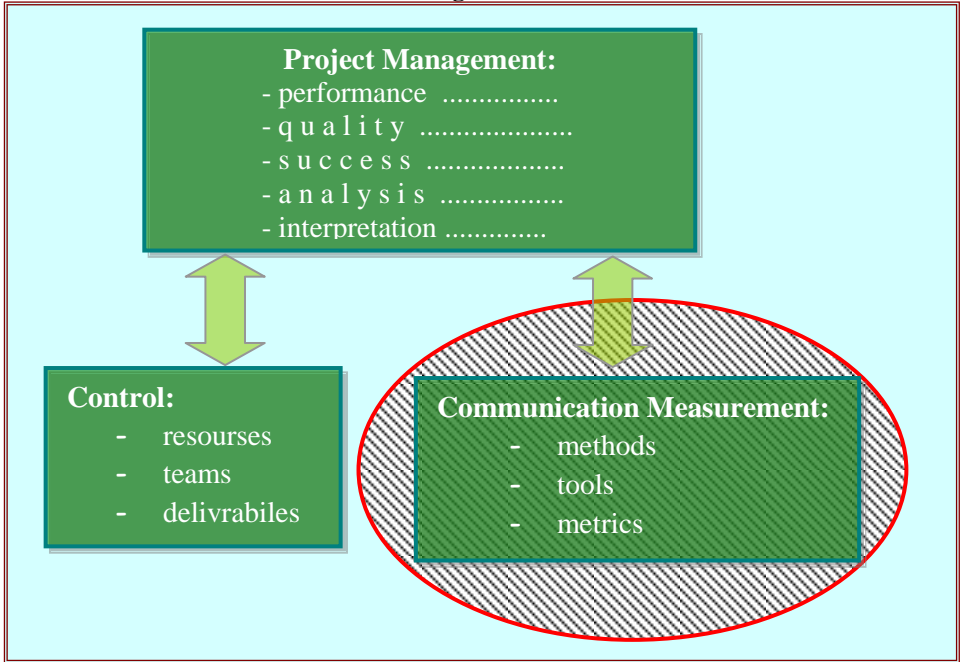
In order to have an accurate perception about the communication process within a project, we must measure it according to some related criteria. According to Angela Sinickas, reputed communications measurement expert, the criteria after which we can measure the communication process in projects are: satisfaction, efficiency, effectiveness and outcome (Sinickas A. 2007)). Achieving satisfaction means that both the audience and the project members are content with their communication skills. Efficiency is perceived as having reached a result on time, within budget and through a few channels. Effectiveness is achieved when the messages and channels used reach their

desired target and finally the outcome is a real change not only in opinions but in objective reality as well.

Problems in communication are still cited as being one of the key reasons why projects fail. This is because most of the communication process in a project is usually done without proper planning driven mostly by personalities and preferences rather than by needs protocols and procedures. The goal of the communication process in a project is to attempt to create a common understanding between team members. Within a project, effective communication can drive the team to achieving the goals it had in mind and also offers a generous amount of personal satisfaction when the project is due. Efficiency in communication can be reached by applying one important rule: being consistent in everything you say and do. Consistency is the key to defining and reaching the desired project goals. Nonetheless, each person has its own communication style and pattern, we cannot be all alike, but there has to be a certain common understanding of the problem at hand so that the result of the communication process is positive (Pritchard C. 2004).

Communication within research projects is usually aided by a set of communication tools which help the sender convey his message and conversely help the receiver decode that message, understand it and send feedback. Selecting the right tools for the communication process relies on establishing the nature of the communication. If communication needs to be done verbally then some of the tools needed might be: voice-mail, teleconferencing, telephone calling, videoconferences, presentations and meetings. If communication uses the written path, then some or all of the following tools have to be taken into consideration: reports, forms, planners, memos, charts, requests, proposals, analyses (Jha S. 2010).

Figure 1. The place and the role of communication measurement in project management.



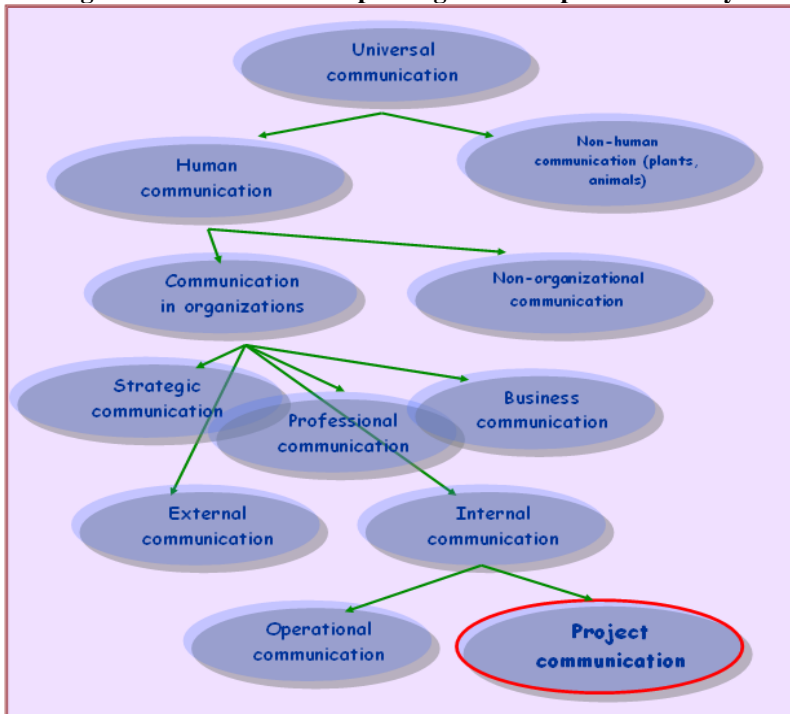
In order to make use of these tools as better as possible, the process of communication in projects should be measured. Communication measurement (see figure 1) provides indicators of success and failure in project communication and is mainly concerned with improving some aspects of internal project communication. Communication measurement within a project increases the level of credibility given to that project and helps improve its communication strategies, messages and also helps in having a more detailed understanding of the project members (Sinickas A. 2007).

Measuring project communication focuses on the work efficiency of the team members, on the project deliverables and on communication management overall. The measurements must point out the progress of the project and they must determine the responsibilities of the team members.

The research methodology for measuring project communication can combine both a quantitative research methodology – the survey questionnaire

– and qualitative research methodologies such as in-depth interviews and focus group discussions. Through these methodologies we attempt to prove that an enriched communication process which follows certain rules can surely improve the outcome of a research project. Through qualitative methods, primary information is gathered, information that can also be included in the survey questionnaire which measures the effectiveness of the research project communications.

Figure 2: Communication paradigm: conceptual hierarchy.



The measurement of the communication process within a project is complex because it requires the researcher to have a holistic approach to it, which includes the three levels of assessment of communication mentioned above: communication efficiency, communication effectiveness and communication outcome. The value of measurement lies primarily in the fact

that it is an opportunity for the project to grow and obtain a higher potential and a positive outcome (Antonis N. 2005).

Table 1. Categorizing communication in different communication fields

Communication Category	Description
Human communication (Ruben 2005; Littlejohn 2002; Pearson 2011)	The communication process consists of: 1) message; 2) encoded message transmitter (person, group); 3) decoded message receiver (person, group); 4) communication channel; 5) feedback on the same channel.
Professional (Pearson 2011; Leydens 2012)	The communication process typical for a person from a different field of expertise.
Business communication (Vergne S. 2005; Singh M. 2009; Leydens J.A. 2012)	The sharing of information between people within an enterprise that is performed for the commercial benefit of the organization. In addition, business communication can also refer to how a company shares information to promote its product or services to potential consumers. (BusinessDictionary.com)
Strategic communication (Castro 2011; Argenti 2005; Tatham 2008)	A systematic series of sustained and coherent activities, conducted across strategic, operational and tactical levels, that enables understanding of target audiences, identifies effective conduits, and develops and promotes ideas and opinions through those conduits to promote and sustain particular types of behaviour.
Organizational communication (May 2005; Cheney 2004; McCroskey 2005; Altınöz 2009)	Communication in organizational contexts – A process by which activities of a society are collected and coordinated to reach the goals of both individuals and the collective group. It is a subfield of general communications studies and is often a component to effective management in a workplace environment. (BusinessDictionary.com)
Project communication (Schwalbe 2010; Buttrick 2010; Jacob 2011; Nicolescu 2001)	The communication process is part of the project's management process.

The methodology described above can be included within the interpretative paradigm of communication. This paradigm states that human beings cannot be studied using models developed for the physical sciences because humans are qualitatively different from natural events. The interpretative paradigm states that reality is made up of subjective perceptions and researchers who agree with this paradigm are interested in studying people as active agents who have free will, purposes, goals and intentions. Within this paradigm, life is considered as being an interaction process between people and therefore it is constantly changing. Language is an essential part of the social life and people understand their lives by its meaning. Another characteristic of this paradigm is that people's actions are based on their own interpretation leading them to act in accordance to their subjective understandings (Giddens A 2006).

The role of communication in research projects should not be neglected even though in this kind of projects the process of communication tends to flow freely and is not so strict as in technological projects. Consistency is the base of all successful projects and the communication process within them is of utmost importance which is what we tried to prove in this paper. Measuring the communication process in research projects takes a complex form mostly because it requires a holistic approach of the process rather than analyzing just parts of it.

From the sources consulted for the study of communication we created an ontology or an hierarchy of concepts in order to create a categorization related to the communication paradigm in projects. The following ontology was created using the DocJax service from <http://www.docjax.com/Search/index.shtml?q=project+communication&x=12&y=16> where over 1,470,000 documents were consulted in different formats (pdf, xls, doc, ppt, html).

Table 2. Communication characteristics useful for: 1. the system and the structure of communication in research projects; 2. personal orientation of the project members in communicating.

Communication category	Classification criteria	Communication method / characteristic
1. The system and the structure of	1. IT Infrastructure	1. IT assisted communication
	2. Information flow	1. Up-down 2. Down-up 3. Horizontal 4. Diagonal

communication in projects	3. <u>Communication channel</u> 3.1 Current communication 3.2 Necessary communication 3.3 Correct communication 3.4 Relevant communication 3.5 Perception of communication	1. Face-to-face between two persons
		2. Face-to-face between two or more persons (in group)
		3. Telephone
		4. E-mail
		5. Written documents (reports, minutes, memos etc.)
		6. Other media tools (videoconference, Facebook, Web pages)
	4. <u>The quantity of vehiculated information</u> 3.1 Current communication 3.2 Necessary communication 3.3 Correct communicating	1. From colleagues to the team
		2. From subordinates
		3. From members in other teams
		4. From the manager
5. From the meetings and presentations in the project		
2. Communication regarding personal orientation in executing the project	1. Communicating for task completion	1. Actual communicating
		2. Necessity communicating
		3. Utility communicating
	2. Communicating for evaluating, modifying or bettering of the project	1. Performance of communication
		2. Communication for operational or technologic changes
		3. Communication for the evolution of the project
	3. <u>Time needed for communication</u> 3.1 Actual time 3.2 Necessary time	1. Communicating with subordinates
		2. Communicating with internal contributors.
		3. Communicating with the manager
4. Communicating with the general manager		

The conceptual hierarchy found above is illustrated in figure 2. By passing through the hierarchy (starting from human communication and reaching project communication) we can find that the communication process

in projects inherits hierarchically most of the communication characteristics. From human communication (with its forms – professional communication, strategic communication and business communication) all the behavioural characteristics are passed on to the lower types of communication.

Having this hierarchy of concepts from the field of the communication paradigm as a starting point, we can create a structure of communication features based on: the types of communication, the methods of communication and the variables which characterize communication. Based on this hierarchy we also created a synthesis of the communication characteristics, categorized on hierarchical subfields (table 1). For our model we selected two categories of the project communication features as in table 2.

3. The CAP model for communication features analysing

The CAP model (Communication Analysis in Projects) has as an input a 96 instances relationship that correspond to 96 projects. The tools used in the methodology of entry data collection were the in-depth interview and the questionnaire. In the input data, one instance corresponds to one project, but if we want to make a more relevant communication analysis more instance data should be collected for as more projects as possible.

The outcomes of the model are statistics, graphs and diagrams which can offer different interpretations for the project communication management. Each input instance from the model has 51 attributes (communication characteristics). The communication values of the characteristics were established by using a Likert scale with 5 values. For example, the “communication channel” characteristic with its attributes “actual face-to-face 2 person communication channel” can have the nominal values {Suficientă, Peste_medie, Medie, Puțină, De_loc}, values which in the model were discretized as {5, 4, 3, 2, 1}.

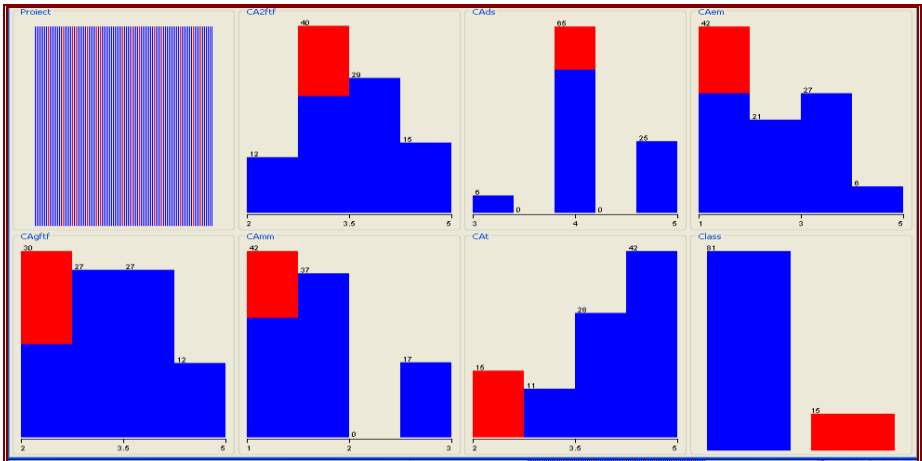
Tabelul 3. Attributes with possible values (Likert scale).

Attribute	Ratings				
Contact current channel	Suficientă	Peste_medie	Medie	Puțină	De_loc
Contact needed channel	Suficientă	Peste_medie	Medie	Puțină	De_loc
Contact correct channel	Acord_ferm	Acord	Neutru	Dezacord	Dezacord_total

Contact relevant channel	Acord_ferm	Acord	Neutru	Dezacord	Dezacord_total
Contact semantic channel	Niciodată	Rareori	Uneori	Frecvent	Tot-deauna
Communication class	Yes	No			

In table 3 we have 6 attributes (5 communication channel attributes and one efficient communication attribute). These attributes were obtained after applying the questionnaires for 96 projects. In the CAP model we introduced a special attribute called “class” which has nominal values {Yes, No}. This attribute characterizes the overall efficiency for the five characteristics of the communication channels.

Figure 3. Grafic representation of the communication characteristics on 5 occurred channels.

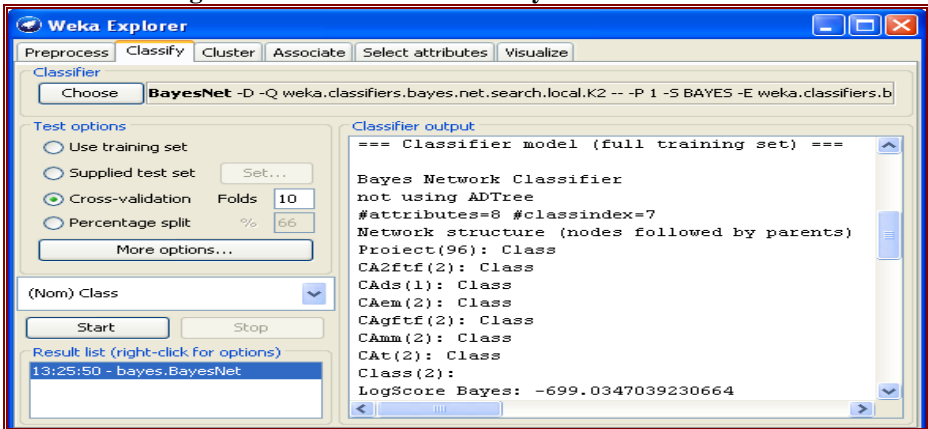


In this model a first interpretation of the communication process refers to the communication channels used by all the project members. Here we will take into consideration 6 attributes which we will analyse and interpret. From the graphics in figure 1 we can see that some of the communication channels from some of the projects are inefficient. For example, 16 communication characteristics from all the communication channels in the projects, are

inefficient. The red colour in the graphics shows the inefficiency and the blue colour shows efficiency above the average standard deviation.

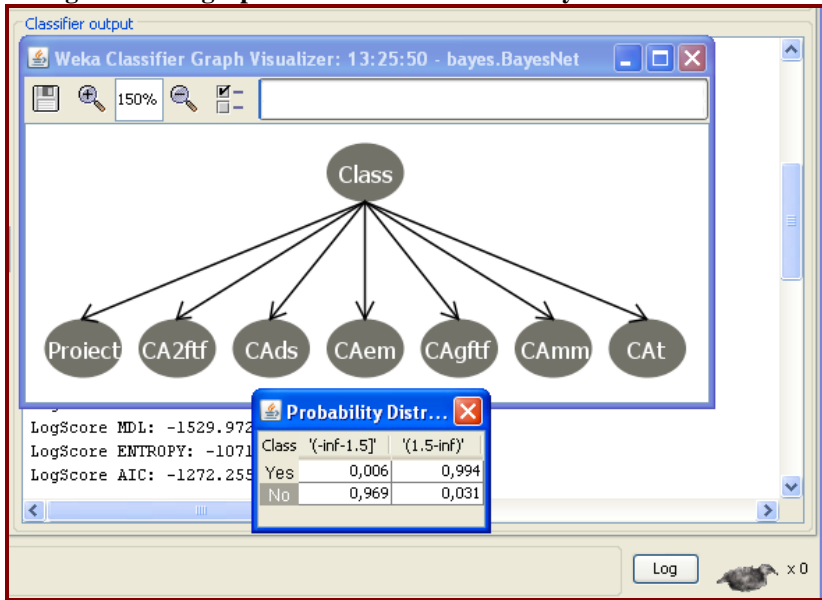
If we process the working data in Weka with the BayesNet classification, algorithm based on Bayesian trust networks, we can obtain a textual model which describes the instance class network (the nodes) created with: different classification scores, a statistic classification summary, the classification accuracy and the confusion matrix (see figure 4).

Figure 4. Textual outcome of BayesNet classification.



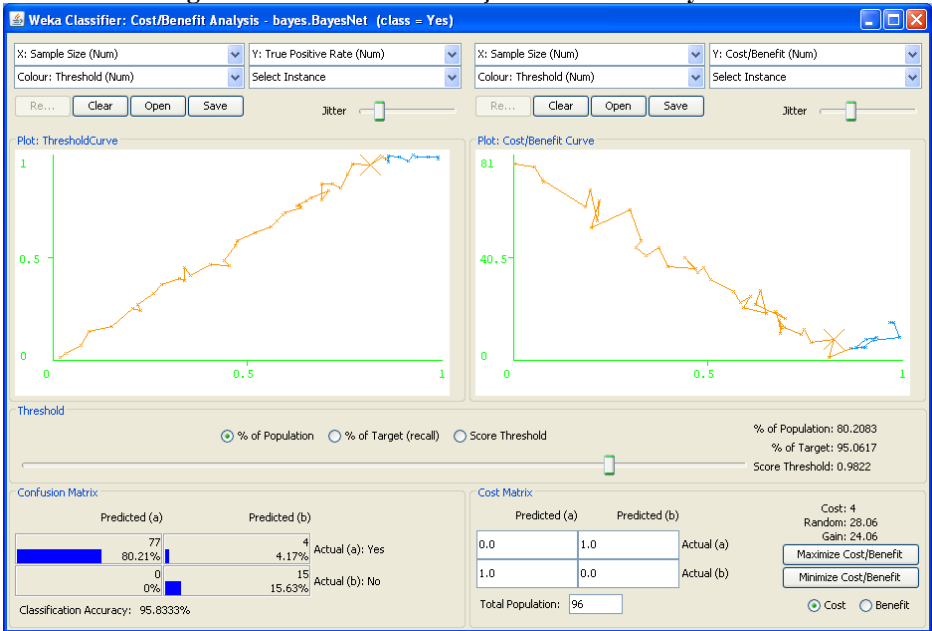
In figure 5 we illustrated the graph that results after applying the BayesNet algorithm on the communication characteristics. For each attribute from the 96 projects we calculated the probability distributions of communication characteristics.

Figure 5. The graph that resulted after the BayesNet classification



Another instance classification resulted from the communication characteristic relation is shown in figure 6. In this figure we illustrated the following: the confusion classification matrix, the cost classification matrix, the cost/benefit curve and the threshold curve.

Figure 6. Grafice de relevanță a clasificării BayesNet.



4. Conclusions

The summary of the communication characteristics obtained after the methodology presented in section 2 was very useful for creating a communication analysis model in research projects. The communication process can be analyzed and interpreted through correctly quantified communication characteristics, but the most relevant interpretations are those obtained by pre-processing the input data in the model and by the discretization on the nominal values.

The CAP model created proves that we can obtain relevant outcomes of the communication process in project management. The outcomes of CAP model help us interpret actuality, necessity, accuracy and relevance of the different communication channels.

Based on the CAP model we create different instance classifications and instance clustering groups with the help of different algorithms implemented in Weka.

The conclusions drawn from the CAP model are relevant aspects which help managers in actually improving the execution process of the research projects' activities and tasks. The CAP model and its results are provided to the project managers and they can use it as a tool for improving the communication process in their projects.

5. References

- Altınöz M, (2009) An Overall Approach to the Communication of Organizations in Conventional and Virtual Offices, *International Journal of Human and Social Sciences* 4:3.
- Antonis N. (2005) Communication audit as an integrated communication measurement instrument: a case study, Dissertation thesis from the University of South Africa.
- Argenti P.A.; Howell R. A. ; Beck, K. A. (2005) "The Strategic Communication Imperative", Massachusetts Institute of Technology (MIT) / Alfred P. Sloan School of Management, MIT Sloan Management Review (SMR) Vol. 46, No. 3, , pp.83-89.
- Arklan Ü., (2011) *Intra-organizational communication and leadership: An interactive approach*, *African Journal of Business Management* Vol. 5(26), pp. 10294-10302, ..
- Balarin M. G. (2006) Communication strategies in management: a case study of interpersonal manager staff communication at a South African university –Rhodes University, available at http://eprints.ru.ac.za/306/1/Balarin_thesis.pdf.
- BusinessDictionary.com, available at <http://www.businessdictionary.com/definition/organizational-communication.html>
- Buttrick R., (2010) *The Project Workout: The ultimate handbook of project and programme management*, Prentice Hall, 4th Edition.
- Castro G.C., (2011) *Without strategy we can only communicate. Only with strategy w can communicate strategically*, available at <http://stratcom-model.com/theory/>.
- Cheney G.; Christensen, L.T., Zorn, T.E., and Ganesh, S. (2004) *Organizational Communication in an Age of Globalization: Issues, Reflections, Practices*, Long Grove, IL: Waveland Press.

- Dow W.; Taylor B. (2008) *Project Management Communications Bible*, Wiley Publishing, USA.
- Giddens A (2006) *Sociology*, 5th edition, Polity Press, USA.
- Iacob D, Cismaru D-M, Pricopie R, (2011) *Relatiile publice Coeziune și eficiență prin comunicare*, Editurii Comunicare.ro, Ediția a III-a.
- Jha S. (2010) *The project manager's communication toolkit*, Taylor and Francis group, USA.
- Leydens J.A. (2012), What does professional communication research have to do with social justice? Intersections and sources of resistance, Professional Communication Conference (IPCC), 2012 IEEE International, 8-10 Oct. 2012
- Littlejohn S. W. (2002), *Theories of human communication*, 7th edition, Belmont, CA: Wadsworth
- May S and M. Dennis K. (2005), *Engaging Organizational Communication Theory and Research*, Thousand Oaks, CA: Sage.
- McCroskey, J. C., & Richmond, V. P. (2005), *The Nature Of Communication In Organizations -Organizational Communication for Survival: Making Work*, available at http://my.ilstu.edu/~lilipper/com329/mccroskey_chapter.pdf.
- Nicolescu O., Verboncu I., (2001) *Fundamentele managementului organizației*, Ed. Tribuna Economică,.
- Pearson J. C.; Nelson P. E.; Titsworth S. (2011), *Human Communication*, fourth edition, Published by McGraw-Hill.
- Pritchard C.(2004) *The project management communication toolkit*, Artech House, USA,.
- Ruben B.D.; Stewart L.P. (2005), *Communication and Human Behaviour*, 5th Edition. Publisher: Allyn & Bacon.
- Schwalbe K.,(2010) *Information Technology Project Management Sixth Edition*, Cengage Learning Cours Technology Boston,.
- Singh M. (2009), *Business Communication*, Biyani Group of Colleges, available at <http://www.gurukpo.com/admin/bookpdf/51.pdf>.
- Sinickas A. (2007) *Measuring the success of your communications*, IACB International Conference, New Orleans, June 24.
- Sinickas A. (2007) *Measuring the success of your communications*, IACB International Conference, New Orleans, June 24,.

- Tatham S. A. (2008) *Strategic Communication : A Primer*, UK Defence Academy.
- Vergne S. (2005), *Living with Ambiguity*, Auxilium Training available at <http://www.auxiliumtraining.com/Ambiguity.htm>.

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