

PROJECT SUCCESS AND COMMUNICATION WITH STAKEHOLDERS

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Purpose: The aim of this paper is to analyze possibilities of using sentiment analysis in project management.

Design/methodology/approach: The research methods used in the article were desk research analysis of available source data on the success of project. Then additional research was done on methods of sentiment analysis.

Findings: During the course of this work was found a way of use sentiment analysis to improve project management.

Research limitations/implications: The proposed idea necessitates research on the verification of the usefulness of the proposed indicators.

Practical implications: The indicators proposed in the work have the potential to be used in the project management support application.

Originality/value: Novelty of proposed paper are idea of two indicators for improvement project management.

Keywords: Project management, Stakeholders analysis, Sentiment analysis.

Category of the paper: Conceptual paper.

1. Introduction

Meaning of the project success evolve in the time. It begins with classical meaning, where project should be finished in time, in budget and in scope. Today project evaluation by stakeholders, is one of the key elements of the project's success. The establishing new knowledge areas in the ISO 21500 standard (ISO, 2012) and also in fifth edition of PMBoK (Project Management Institute, 2013), dedicated only to the stakeholders, is the realization of this view.

As the importance of stakeholders in the project grows, so does the role of communication with them. Currently implemented projects are largely based on electronic communication. It is also related to the development of the COVID-19 pandemic, which limited the possibility

of face-to-face meetings. Increasing the amount of electronic communication makes it possible to analyze it automatically.

Computer methods of natural language processing (NLP) are currently being developed. Methods of opinion analysis, sentiment analysis have appeared. This gives the possibility to use these methods also in project management. This conceptual work hears the justification for this possibility. As contemporary views on the assessment of project success are based on managing stakeholder expectations, we can propose new tools to improve project management. Those new tools should be based on measurement stakeholders sentiment. Knowing the stakeholders attitude or change in attitude we can be more efficiently manage project.

The work is divided into the following parts. The next section presents the evolution of the concept of project success. The next section presents the growing role of communication in the project. The next part shows the methods of natural language analysis with particular emphasis on sentiment analysis. The next part tries to present the possibilities of using the above facts in improving project management. The paper ends, which present the directions of further research on the use of NLP in project management.

2. Evolution of project success

Project as a temporary endeavor, undertaken to create unique result (Project Management Institute, 2013), must have his own success criteria. Cooke-Davies (Cooke-Davies, 2002) distinguish the success of the project from the success of project management (case of the Sydney Opera House). This is an important distinction as it results in a breakdown between success criteria and success conditions. Jugdev and Muller (Jugdev, and Muller, 2005) presents project management history according to the way of understanding success. Paper presents history of project management into time periods.

- The period spanning the 1960s to 1980s was characterized by the implementation of projects in isolation from the client. The results were handed over after the end of the project. The most common measure of success during this period was the completion of the project on time, within budget and within the agreed specification.
- The next period covers the 1980s. It focuses on customer relations. As a result, critical lists of Critical Success Factors (CSFs) were defined.
- The period spanning the 90s of the twentieth century when it was understood that the success of the project depends on the interaction between all stakeholders. During this period, the CSF Frameworks are defined.
- Project management in 21st century (strategic) – a holistic view of the project and its results from the perspective of the stakeholders. The assessment covers the entire life cycle of the project as well as the product.

This evolution had influence on changes in project management standards. Underlining the role of stakeholders in the 5th edition of PMBoK standard (Project Management Institute, 2013), follows changes of the ISO21500 standard (ISO, 2012). In the Project Management Institute standard it manifested by adding a new knowledge area devoted to stakeholders.

In the presented evolution of the concept of project success, the growing importance of stakeholders is visible. From the initial omission of this aspect in the assessment to the contemporary inclusion of the stakeholder perspective.

3. Communication with stakeholders

The evolution of views on the success of the project presented in the previous section shows the growing role of stakeholders. We must consider who the stakeholders are.

The concept of stakeholders appeared in the management sciences related to project management. The term "stakeholder" was first used in 1963 in the Stanford Research Institute document to identify groups of entities before which business owners should be responsible and without which the organization would cease to exist (Freeman, 2010). Similar terms used in the literature and business practice are: "interested groups", "interest groups", "actors", "partners", "interested parties", "participants". Many publications on corporate planning (Ansoff, 1965), system theory (Churchman, 1979), organization theory (Rhenman, 1973) and corporate social responsibility (Preston, and Post, 1975; Votaw, and Sethi, 1973) referred to the concept of stakeholders (Freeman, 2010).

Freeman defines stakeholders as any individual or group that can interact with or be affected by the organization in pursuit of its goals (Freeman, 2010). In this definition, the relationship between stakeholders and the organization may be of a diverse nature, where both stakeholders and particular organization may influence each other.

In the literature, we can find the concept that the stakeholders are people or groups that have direct or indirect contracts with the organization (Donaldson, and Preston, 1995). Thus, a stakeholder can be virtually any element of the closer and more intimate environment, which is linked to the organization.

With a specific situational context it has great importance in analyzing the impact of the stakeholder on the organization. At this point, it should be emphasized that the organization is not always the subject of interaction of the stakeholders as a whole, it can often be a project alone.

Hierarchical dependencies in the organization, where the project is implemented, make the strength of the stakeholder influence dependent on the position in the hierarchy. It was especially noticed in IT projects. As the development of software products and systems generally requires collaboration of many individuals, groups, and organizations, it can be

modeled as networks of stakeholders (Fricker, 2009). Those networks constitute stakeholder structures. In Fricker paper (Fricker, 2009), it was considered in context of Requirements Analysis. There were attempts to quantify the strength of stakeholder influence on the project, taking into account their structure. In paper (Targiel, 2017) there was used AHP method to prioritize requirements. In other paper (Targiel, 2021), there was used DEMATEL method. There are also stakeholder modeling approaches such as the Onion model (Alexander, and Robertson, 2004) which ignore relationships between stakeholders, which are important to define communication channels.

Engagement stakeholders in project management is based on effective communication. Scholes and Clutterbuck (Scholes, and Clutterbuck, 1998) propose even Integrated Approach to stakeholders communication. Last step in this approach is "Making communication management a core competency". In contemporary projects, this communication is largely based on electronic means. This opens the possibility of using computer methods of text analysis. The problem of electronic communication in construction project was discussed in El-Saboni paper (El-Saboni et al., 2009).

4. Natural Language Processing

Recent years have seen a strong development of computer natural language processing methods. After the first periods of Symbolic NLP (1950s-early 1990s), and Statistical NLP (1990s-2010s), present NLP methods have huge potential for implementation. Natural Language Processing (NLP) refer to automated machine-driven algorithms for understanding of human language and extracting information (Dinov, 2018). Common tasks for these methods include text and speech processing, morphological analysis, syntactic analysis, lexical semantics, relational semantics, and discourse (Natural language processing, 2021). Some new applications includes: automatic summarization, machine translation, natural language generation. One of the very interesting directions of NLP development in the context of project management is the analysis of sentiment.

Sentiment Analysis (SA) is defined as "the use of natural language processing, text analysis, computational linguistics, and biometrics to systematically identify, extract, quantify, and study affective states and subjective information"(Sentiment analysis, 2021). SA is used to classification the polarity of text at the document, sentence, or word level. Text can be classified as positive, negative, or neutral. Some more sophisticated models, can classify also emotional states such as enjoyment, anger, disgust, sadness, fear, and surprise according to Plutchik wheel of emotions (Plutchik, 1980).

There are two main approaches in Sentiment Analysis:

- machine learning – the analyzed text is introduced to the input of neural networks, on the output of which the sentiment value is obtained,
- lexical approach – has used lexicons of known sentiment-related words, their polarities, then uses those to score the sentiment of the text.

The first approach has some disadvantages in context of project communication. There are not enough data to learn neural network. This problem can be solved by using pretrained neural networks with embedded layers like GloVe for Tweeter texts (Pennington et al., 2014).

The second approach is based on lexicons. They are created in specific language, based on specific corpus. This approach was used in Tourani et al. In this paper (Tourani et al., 2017), authors have used general lexicons to analyze communication in open source projects. There are some publicly available sentiment lexicons which includes Affective Norms (Warriner et al., 2013), SentiStrength (Thelwall et al., 2010), SoCAL (Taboada et al., 2011), LABMT (Dodds et al., 2011). They can be used to analyze sentiment.

Through the lexical analysis of messages sent by the stakeholder, it is possible to evaluate their attitude (sentiment) towards the project. Identification of sentiments and emotions can provide an indication of someone's opinions towards certain project decisions or other people. This approach is used in politics as in business contexts (Pang, and Lee, 2008). It was also used in software engineering (Murgia et al., 2014).

5. Improvement Project Management with Sentiment Analysis

The growing importance of stakeholders in achieving the project's success is noticeable. Their commitment is based on communicating with them. There is also a visible tendency for communication to be based on electronic means. E-mails and instant messaging are used. This communication is susceptible to automatic analysis. On the other hand, effective methods of text analysis are created. This raises proposals to use these methods in project management.

Since stakeholder assessment is important in assessing success, it can be crucial to test their attitude towards the project. It is possible when analyzing the sentiment contained in communication with a stakeholder. Changing this attitude from positive to negative is a signal that appropriate actions should be taken to ensure that the attitude and, consequently, the assessment are positive.

The success of the project is a product of the assessments of all stakeholders. Of course, the importance and strength of stakeholder influence varies. Hence, it is necessary to weigh the attitude of the stakeholder and the strength of its influence. This gives rise to the idea of a global sentiment indicator. Changing the value of this indicator from positive to negative will make it necessary to take corrective actions at the level of the entire project.

The proposed indicators can be implemented in the project management support system. The first indicator can be used to monitor the attitudes of individual stakeholders. The second indicator monitors the entire project.

Determining the sensitivity of the system requires further research. It is a question whether the messages communicated will allow the calculation of changes in the level of sentiment. Another question that needs to be answered is whether the calculated changes in the level of sentiment indicate significant changes in the assessment of the project.

6. Conclusions

The growing role of stakeholders in the project makes it necessary to follow their attitudes. This can be done by analyzing the electronic communication they send. The importance of electronic communication in projects has increased with the advent of the COVID-19 pandemic. Sentiment (attitude) analysis methods are developed. Their use in project management is the main contribution of this work. Two indicators were proposed to track stakeholder sentiment (attitude). The first one follows the sentiment on a single channel of communication. The second is used to track global sentiment in the project. After verifying the usefulness of the proposed indicators, they can constitute the basis of the project management support system. By using them, the Project Manager could receive signals about the need to take appropriate action in relation to the stakeholders. This type of activity increases the Project Manager's capabilities in project management. The proposed system requires further research on system verified. After implementation it can be validated in real project. Contemporary methods of text analysis create new tools in project management.

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