Three Dimensional Stakeholder Analysis - 3dSA: adding the risk dimension for stakeholder analysis

Selim Tugra Demir*
Built Environment & Sustainable Technologies (BEST) Research Institute,
School of the Built Environment,
Faculty of Technology & Environment,
Liverpool John Moores University,
Liverpool, L3 3AF; UK.
Email: S.T.Demir@2009.ljmu.ac.uk
*Corresponding author

David James Bryde
Built Environment & Sustainable Technologies (BEST) Research Institute,
School of the Built Environment,
Faculty of Technology & Environment,
Liverpool John Moores University,
Liverpool, L3 3AF; UK.
Email: D.J.Bryde@ljmu.ac.uk

Damian John Fearon
Built Environment & Sustainable Technologies (BEST) Research Institute,
School of the Built Environment,
Faculty of Technology & Environment,
Liverpool John Moores University
Liverpool, L3 3AF; UK
D.J.Fearon@ljmu.ac.uk

Edward Godfrey Ochieng
Built Environment & Sustainable Technologies (BEST) Research Institute,
School of the Built Environment,
Faculty of Technology & Environment,
Liverpool John Moores University
Liverpool, L3 3AF; UK
E.G.Ochieng@ljmu.ac.uk

Biographical notes

Selim Tugra Demir is a research student (PhD) in the Built Environment and Sustainable Technologies (BEST) Research Institute, School of the Built Environment at Liverpool John Moores University. Tugra has an academic background in Civil Engineering (Bachelor's Degree),

International Project Management (Master's Degree) and Executive Leadership (MBA with Distinction). He has worked in the fields of Project Management and Construction Management in Germany and in the UAE. His research interests are in the areas of risk management, stakeholder management, agile and lean.

David Bryde is a Reader in Project Management in BEST Research Institute, School of the Built Environment at Liverpool John Moores University. David joined LJMU in 1991 and obtained a PhD in project management. His research interests focus on modern management methods in Construction, such as Lean, Agile, Uncertainty & Risk Management, Earned Value Analysis (EVA), Supply Chain Management and Stakeholder Engagement Methods. David has published widely in international journals and presented at various international conferences. He is a member of the Association of Project Management and the Project Management Institute.

Damian Fearon is a Principal Lecturer in Construction Management in Liverpool John Moores University, School of the Built Environment and a member of BEST. Damian has worked in the construction industry for 22 years with a mixture of industrial and academic experience, he returned to LJMU in 2008. His research interests are project management, sustainable construction, performance management and organisational development. Damian is currently studying for a PhD in Organisational Development, with a particular interest in the use of projects as episodic change intervention mechanisms. Damian is a member of the Royal Institution of Chartered Surveyors.

Edward Ochieng is a Senior Lecturer at Liverpool John Moores University and is a member of BEST Research Institute. He is involved in project management teaching and research. Edward's research interests include: Multicultural project teams, Project culture, Cultural diversity, Integrated supply chains, Partnering, Managing change, Modelling Technology, Managing processes, Project complexity, Project performance, Project Governance, Value creation, Sustainability in construction and Project integration. He has presented in both national and international conferences, such as Association of Researchers in Construction Management (ARCOM), Australian Universities Building Educators Association (AUBEA), CIB World Congress and International World of Construction Project Management whereby he has shared his knowledge on 'Global Project Teams, Project Complexity, Project Performance and

Project Team Integration'. His research into project management is mainly concerned with people experiences and organisational challenges of managing projects in developing and developed nations.

Abstract

There is a need for better integration of stakeholder analysis and risk management, because there are risks which can arise from the actions of stakeholders which can impact on the project aims and objectives. To meet this need the authors propose that stakeholders need to be analysed in three dimensions. This gives higher transparency to a stakeholder's characteristics and creates a stronger link to risk management. In addition to a stakeholder's power and interest a third dimension of "attitude" is developed. Hence a Power-Interest-Attitude Matrix is generated and applied to a real case construction project in Germany. This application to a real project scenario demonstrates how stakeholder analysis can be enhanced over the commonly used two dimensional matrices, to better integrate stakeholder analysis with risk management.

1.1 Keywords:

Construction, Project Management, Stakeholder, Stakeholder Analysis, Power-Interest-Matrix, Risk, Risk Management, Risk identification, German Construction Project, Construction Case Study.

1 Introduction

Although the constructed facility is immobile or static, the environment in which construction projects are realised is highly dynamic and often complex. Further, each construction project has a large impact on society and the wider environment. In this respect there are numerous parties who can affect or can be affected by the outputs and outcomes of a project. These parties are called stakeholders. Dealing with stakeholders is part of the daily business for each involved party in construction; even if it is not practiced with a formal approach or method. The dynamic and complex environment which construction projects face creates changing stakeholder groups over the whole project life cycle. Therefore the project delivery has to focus on the identification, analysis and engagement with key stakeholders in each stage of the project. This is necessary as the stakeholders can influence whether the project is deemed a success or a

failure. Thus stakeholders can make a positive contribution to a project achieving its aims, but on the other side of the coin they can also cause threats.

A common tool for stakeholder analysis in construction projects is the Power-Interest-Matrix. This assesses the level of power (authority) of the stakeholder to influence the outcome of the project and the level of interest (urgency) the stakeholder has in seeing the project completed. The tool is useful as it provides a focus for stakeholder engagement. Those involved in the management of construction projects are required to consider the views and perceptions of stakeholders when establishing the risk management framework. This is so they communicate with them the details of the risks in a transparent way. Particular attention needs paying to those with high salience (high power/high interest). Therefore the focus of stakeholder theory in risk management is on considering the views and perceptions of stakeholders with high salience and engaging with them actively (Ellen and Duijn, 2011).

Given that a risk can be defined as a variation from an aim (Project Management Institute, 2008; International Organisation for Standardisation, 2009) and considering that the behaviour of stakeholders can create such a variation, there is also another relationship between stakeholders and risk, namely: risks which can arise out of key stakeholders actions. The current project management literature shows different ways of integrating stakeholder analysis with risk management. But as Olander and Landin (2005) highlighted, further investigation is required into the relationships between stakeholder analysis (especially stakeholder mapping) and risk management. The call for further work provides the rationale for this paper.

The Power-Interest-Matrix is the most commonly used stakeholder analysis tool in construction (Chinyio and Olomolaiye, 2010). The high success of this tool in the construction industry might be related to its simplicity, as the industry prefers and requires techniques which are simple and flexible (Garnett and Pickrell, 2000). However, engagement strategies which are developed out of this tool might be misleading, because the relationship between power and level of interest does not reflect the attitude towards the project, i.e. if the stakeholder is a supporter or an opponent of this project. Not relating this risk dimension to the stakeholders might result in reactive risk management and hence crises management.

To meet the need for better integrated stakeholder analysis and risk management this paper suggests extending the Power-Interest-Matrix, introduced above, beyond the current two dimensions. A third dimension is proposed which is the attitude towards the project by the key stakeholder (after Murray-Webster and Simon (2006)). Therefore this paper presents a modified Power-Interest-Matrix, labelled the Three Dimensional Stakeholder Analysis" or 3dSA for short. This provides a tool that is easy to implement in construction projects.

The tool is illustrated through a practical application to a real case construction project in Germany. A comparison is shown of how stakeholder analysis is traditionally done and how it is improved and better integrated with risk management using the 3sdSA.

2 Background – Literature review

2.1 Why do we need stakeholder analysis in construction projects?

The roots of stakeholder analysis are in political and policy sciences (Brugha and Varvasovszky, 2000). In the management literature the term 'stakeholder' first appeared at the Stanford Research Institute in 1963 (Freeman, 1984). The growing realisation that stakeholders can affect an organisation's success has led to the development of approaches to analyse stakeholders (Brugha and Varvasovszky, 2000; Reed et al., 2009). These focus on the development of systematic tools, with clearly defined steps for showing the organisation or project stakeholders in a transparent way (Varvasovszky and Brugha, 2000).

The most basic description of a construction project is the planning and building of some physical facility (Pinto and Covin, 1989). The product, i.e. the constructed facility is immobile, which means the facility has to be produced at the point of consumption (construction site) (Gann, 1996). Each project requires a unique combination of labours and materials being coordinated on the construction site (Eccles, 1981). There are a large number of specialists involved, such as [...] "carpenters, bricklayers, plumbers, pipefitters, electricians, painters, roofers, drywallers, sheet metal workers, glaziers, and labourers" (Eccles, 1981, p. 337). There is a high range of materials and component parts (Gann, 1996). The management, planning and coordination of the labour and materials is a complex task (Gidado, 1996). This makes construction projects more

complex than projects from other industries (Winch, 1989). Construction projects have to be undertaken under a short time framework, but have a long term impact in society (Harris, 1998). Therefore many different and sometimes opposing interests of various societal groups have to be considered during the project life span, which also includes the operational phase of the facility. So construction projects have to deal with stakeholders, just like other endeavours (Chinyio and Olomolaiye, 2010).

A stake is an interest in the project (Association for Project Management, 2006), which "a group or individual has in the outcome of a corporation's policies, procedures, or actions toward others" (Weiss, 1998, p. 20). Stakes can be based on "[…] legal, economic, social, moral, technological, ecological, political, or power interests" (ibid. p. 20). Freeman (1984, p. 25), one of the early proponents of the stakeholder management approach in business sciences (Reed et al., 2009), defined the term stakeholder as "any group or individual who can affect or is affected by the achievement of the firm's objectives". This forms the basis for most of the definitions of the term stakeholder in current literature (Reed et al., 2009). This is reflected by the definition of the Project Management Institute (2008, p. 23) who describe stakeholders as follows:

"Stakeholders are persons or organizations (e.g. customers, sponsors, the performing organization, or the public), who are actively involved in the project or whose interests may be positively or negatively affected by the performance or completion of the project".

The definitions of the terms stake and stakeholder form the basis for stakeholder analysis, which "[...] is a framework that enables users to map and then manage corporate relationships (present and potential) with groups who affect and are affected by the corporation's policies and actions" (Weiss, 1998, p. 30). Therefore stakeholder analysis is a process which shows the needs of different groups related to the project.
Slack et al. (2006) suggest a three step process for stakeholder analysis:

1. Identify stakeholders
2. Prioritise stakeholders
3. Understand key stakeholders

The first step is critical and it is important for the project management team to identify those stakeholders who can affect the project at early project stages (Olander and Landin, 2005). It might not be possible to

identify all stakeholders or provide highly detailed information about the characteristics, but it should be possible to provide initial data for other project management tasks, like risk management (Celar et al., 2010). This is especially important for large scale projects, due to the fact that small failures at early stages can have huge consequences at later stages.

Chinyio and Olomolaiye (2010, p. 2) stated that the stakeholders for construction projects include among others "[...] the owners and users of facilities, project managers, facilities managers, designers, shareholders, legal authorities, employees, subcontractors, suppliers, process and service providers, competitor, banks, insurance companies, media, community representatives, neighbours, general public, government establishments, visitors, customers, regional development agencies, the natural environment, the press, pressure groups, civic institutions, etc.". Stakes are not always obvious or explicit (Weiss, 1998) and projects can have negative as well as positive stakeholders. For example, some stakeholders may benefit from the successful completion of the project, while others may perceive the failure of the project as a more desirable outcome (Project Management Institute, 2008). Olander and Landin (2005) concluded that construction projects have a dynamic environment during all project phases. This means key stakeholders change in each project phase and stakeholder management, including identification, has to be done in all parts of the project life cycle.

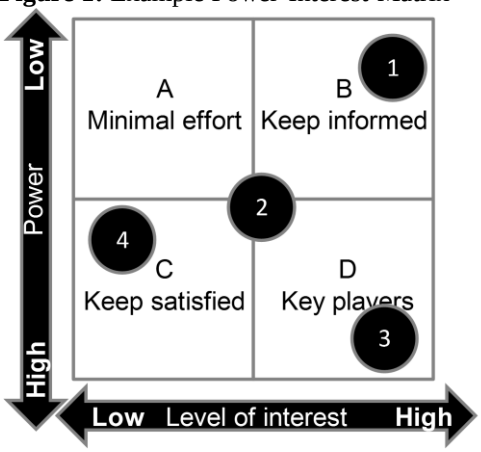
As there can be many stakeholders to a construction project it is important to prioritise them and focus most time and effort on those that are key to the successful accomplishment of the project. This will ensure the efficient use of effort in order to communicate and manage the expectations of those deemed to be important by the project delivery organisation (Slack et al., 2006). There are several classification models available to prioritise stakeholders. The Project Management Institute (2008, p. 249) has listed a few, which are as follows:

- Power/interest grid
- Power/influence grid
- Influence/impact gird
- Power/urgency gird

The third dimension for analysing stakeholders will be introduced in the framework of this paper through the power/interest gird, which is also called the Power-Interest-Matrix (see figure 1). This is because it is the

one most commonly used in the construction industry (Chinyio and Olomolaiye, 2010).

Figure 1: Example Power-Interest-Matrix



The Power-Interest-Matrix is a two dimensional grid, which shows how interested each stakeholder group is in achieving the project objectives and whether the stakeholder has the power to influence the achieving of the objectives (Johnson et al., 2005).

Ihlen and Berntzen (2007) divide the power of stakeholders into three main categories: force (coercive power) i.e. activist groups; material or financial resources (utilitarian power) i.e. sponsors; symbolic resources (normative power) i.e. a city council or public authorities.

In the example shown in Figure 1 Stakeholder 3 has the highest salience, so attention would focus on them in terms of stakeholder engagement activities. Less time and effort will be spent on Stakeholder 4 and 2 as they have lower levels of power and interest than Stakeholder 3. So it is sufficient to understand what is needed to keep Stakeholder 3 satisfied, with careful monitoring of their level of interest in case it increases as the project progresses and they become a key player. A similar watching brief is required on Stakeholder 2 for any fluctuations in salience (up or down) and the resultant impact on the required level and type of engagement activity. An engagement strategy of keeping informed is appropriate for Stakeholder 1, as long as their interest remains high and their power low.

To conclude, through grouping the stakeholders on the Power-Interest-Matrix, the project management function gets a better understanding about

how the communication and the relationships between stakeholders can affect the project objectives (Olander and Landin, 2005).

Understanding the expectations of stakeholders is an important part of project management (Project Management Institute, 2008). There is a need to know how key stakeholders feel about the project and how they will react to it; both in terms of the outputs and outcomes from the project and the process of project delivery (Slack et al., 2006). Furthermore one needs to understand how to engage with them as the project moves through its life cycle (ibid.). Inadequate management of stakeholders leads to conflicts and problems, which can result in risk or crises throughout the project life cycle (Olander and Landin, 2005). The different expectations and interests have to be considered in each project phase by the project management (ibid.). Paying insufficient attention to the needs, expectations and interests of key stakeholders can lead to project being considered a failure, even if it was managed within the planned cost, time and scope framework (Bourne and Walker, 2005). Therefore effective project managers need keen analytical and intuitive skills to identify stakeholders, as well as relationship management skills to engage and communicate with the key stakeholders (ibid.).

2.2 The relationship between stakeholder analysis and risk management

The term risk has different meanings for different individuals. Negative definitions of the term ‘risk’ can be related to the origin of the word. It is based on the Italian word ‘risico’ or ‘risco’ (today ‘rischio’) from the sixteenth century, which normally means to sail around cliffs or dangerous rocks (Girmscheid, 2006). However, in management sciences or in management practice a risk is defined as the “effect of uncertainty on objectives” (International Organisation for Standardisation, 2009, p. 1). This definition shows that a risk can be a negative or positive event which might have an impact on the project aims and objectives (Institute of Risk Management et al., 2002, p. 2).

Project risk management seeks to increase the probability and impact of positive events and to decrease the probability and impact of negative one’s (Project Management Institute, 2008). The risk management process consists of the following steps (International Organisation for Standardisation, 2009):

Author

1. Establishing the context
2. Risk assessment
    - 2.1. Risk identification
    - 2.2. Risk analysis
    - 2.3. Risk evaluation
3. Risk treatment

Within these steps consultation, communication and monitoring are process elements which have to be done continuously through the project life cycle (International Organisation for Standardisation, 2009).

Stakeholders have to be considered in the risk management process in two ways. Firstly, the views, perceptions and perspectives of stakeholders have to be considered when establishing the context and defining the risk criteria (Miller and Bromiley, 1990; Williams et al., 1999; Roy, 2004; Schwarzkopf, 2006; Sparrevik et al., 2011). This linkage between stakeholder and risk management is related to the decision making and engagement of stakeholders (Williams et al., 1999). This is a communication and relationship management issue, because the multiple stakeholder perspectives affect the risk perception and thus the decision making (Schwarzkopf, 2006). Secondly, accepting that the term 'stakeholder' means any party who affects or can be affected by the actions of another party, shows clearly that there is a link between stakeholder and risk (Thompson, 2010). Stakeholders can cause an uncertain event on the project objectives. Therefore there are risks which can arise out of stakeholders' engagement with the project.

Hence stakeholders have to be considered in risk assessment as well as risk treatment. This relational perspective of stakeholder analysis and risk management has been considered by Leung and Olomolaiye (2010). They developed a risk register, in which the risk event is assigned to various stakeholders. But in accordance with Olander and Landin (2005) further attention is required on developing tools and techniques that focus on the relationship between stakeholder analysis (especially stakeholder mapping) and risk management.

2.3 Problem definition and research aim

Thompson (2010) and Leung and Olomolaiye (2010) established a link between stakeholders and risk. There are risks which could arise out of

stakeholders' attitudes and behaviour. Stakeholder analysis is a tool which shows the needs of different groups related to the project. Conducting stakeholder analysis involves considering the needs of different groups related to the project. But how far would stakeholders go to achieve their aims or to see their interests prevail over the project's goals? Possible answers to this question highlight a huge risk factor (positive or negative) which is not considered in the way stakeholder analysis is currently performed. The traditional way of performing stakeholder analysis characterises stakeholders by their power and by their level of interest in the project. There are also other ways to express the characteristic of stakeholders but these alternatives are also two dimensional i.e. power/interest, power/influence, influence/impact, power/urgency (Project Management Institute, 2008).

Analysing a stakeholder across three dimensions has the potential to provide a higher degree of transparency in terms of its likely impact on the project (Murray-Webster and Simon, 2006). Such heightened transparency will create a stronger required link to risk management. As proposed by Murray-Webster and Simon (2006), this third dimension is classed as 'attitude'. This refers to a stakeholder's inclination to be broadly supportive, hostile or neutral towards the project. Such inclinations can cause a potential benefit/opportunity or failure/threat if translated into specific actions and behaviours on their part. Adding this third dimension gives an insight to the project management function of threats or opportunities which can arise out of those stakeholders. This is important in order to develop an appropriate engagement strategy and in order to set right priorities.

Therefore the overall aim of this paper is to develop a project management model that incorporates the three dimensions of a stakeholder as described above: power, interest and attitude. Such a model will be part of an integrated stakeholder analysis/risk management tool. Supporting objectives of the paper are to apply the model on a real case construction project, to draw conclusions and to identify areas for further investigation.

3 Method

3.1 Research strategy

Author

This paper seeks to develop a tool to help address problems at the interface between stakeholder analysis and risk management. This development will be done in two stages. Firstly by reviewing the trends in current literature and by observing the traditional approach to stakeholder analysis as typified on a real case construction project. Secondly, the tool will be implemented on the same real case construction project. Then conclusions will be drawn by comparing the actual and new way of carrying out stakeholder analysis.

Data on the traditional approach will be collected using archival records (initial project report and project status reports). This will provide information on who are the salient stakeholders and how they are being managed. After the records have been reviewed the researchers will ask questions about the gathered information with project management practitioners. This will fill in the gaps between theory and practice.

3.2 Case study – Dornier Museum

The case study is the Dornier Museum, which is the construction of the new museum of aviation and aeronautics in Friedrichshafen, Germany. The project was initiated by Silvius Dornier who is the son of Claude Dornier (1884 – 1969). The museum gives to its visitor's insights into the developments in aerospace and aviation, which have been mainly influenced through the pioneering activities of Claude Dornier. The Dornier Museum is located next to the Zeppelin Museum, the second Museum about aviation in Friedrichshafen. It is also located close to the airport in Friedrichshafen. Annually 150,000 visitors are expected to visit by the museum operators.

The building has the following technical key information:

- Gross floor area: 7,375 m²
- Gross volume: 50,900 m³
- Length / Width / Height: 112 m / 54 m / 12 m
- Foundation: 72 piles (length 18 m)
- Geothermal: 76 geothermal probes, each 80 m depth

The project has an investment figure of approximately 30 Mio €. The design phase took 15 months. The execution has been done in 18 months. More than 40 engineering and consultancy firms and more than 300 craftsmen were required for the implementation of the design and execution.

4 Findings and Discussion

4.1 Traditional Approach to Stakeholder Analysis

The initial project report and existing status reports of the project showed that stakeholder identification was initiated in the early stages of the project. The project management function listed key stakeholders in a table where they were categorised as either internal or external to the project team. Stakeholders were identified through reports from previous similar types of projects and through the experience of the project team members.

The identified stakeholders were analysed qualitatively by the project team in regard to their power and the level of interest in the project. The analysis is based on subjective opinions where points have been given from 1 (low) to 5 (high) for both criteria. The analysis of the key stakeholders was done tabular and a summary of the output from the analysis is shown in Table 1.

Table 1: *Power-Interest-Table of the Case Study: Traditional Approach*

Stakeholder	***Power***	***Level of interest***
Client	*5*	*5*
Public authorities	*5*	*4*
Project Management	*3*	*5*
Aerospace Foundation (sponsor)	*2*	*3*
Operator	*1*	*3*
Architect	*2*	*4*
MEP Planners	*1*	*1*
Contractor	2	1
City	4	2
1 = none … 5 = very high		

After the stakeholders were analysed, the project team created a table in which priorities have been set and suggested treatment strategies listed. The results of this activity were presented to the client in the initial project

report. This gave the client the ability to add key stakeholders and to evaluate the ratings given to the power and the level of interest of the stakeholders.

Clearly in the early stages of the project there was a strong alignment between theory and practice. The project team identified and mapped their key stakeholders, based on both lessons learnt from previous projects and expert experience. The project expectations of those stakeholders was identified and written down. Out of that the key stakeholders were analysed in regard to their power and interest. This gave the required level of transparency to the project team in order to develop treatment and engagement strategies.

However, stakeholder analysis theory emphasises the cyclical and iterative nature of the formal process and, in this respect, practice on the project converged from the theory. The data showed that formal identification and analysis resulting in some form of documented output was only carried out at the project initiation stage. No evidence of further formal analysis was found in any of the status reports produced subsequent to the initial project report. But interviews revealed that stakeholder identification, analysis and engagement did take place in each stage of the project, albeit on an informal basis. It was undertaken verbally in discussions between the project management and stakeholders. This informal approach very much aligns with the notion of stakeholder engagement being an important soft skill, which is focused on effective verbal communication.

Whilst informal approaches are certainly necessary and very useful, they are best viewed as being supplementary to formal approaches rather than as an alternative. There are dangers in undertaking such vital tasks on only an informal basis. There is less transparency and no continuity. It relies on the level of skill and experience of the project team, which will vary from team to team. Team members might leave and the knowledge they have gleaned relating to stakeholders will be lost. In the event of things not going to plan on the project the Sponsor may want evidence of how stakeholders have been engaged and such evidence is best presented in the form of written documents. Crucially the highly dynamic environment of construction projects often results, amongst other things, in the appearance of new stakeholders or the disappearance of existing stakeholders. Also stakeholder needs and characteristics change as the project moves through its life cycle.

In order to be able to cope with these changing project requirements from a stakeholder management perspective, the project management function needs to make sure that the stakeholder analysis is updated (continuity) and it needs to maintain the high visibility (transparency) of the stakeholder analysis. This will help in the development of an appropriate stakeholder treatment or engagement strategy, which can be only achieved through a combination of both formal and informal processes. Stakeholder analysis on the case study using the traditional approach was not done formally over the whole project life cycle. This had its limitations as the changing stakeholder conditions might be neglected and the client will not have a solid basis for decision making on how to engage with the stakeholders.

4.2 Amended Approach to Stakeholder Analysis

The Power-Interest-Table of the case study (shown in Table 1) reflects the traditional way of how stakeholders have been analysed for the Dornier Museum in Friedrichshafen, Germany. The level of power from the stakeholder has been related to the level of interest by the project management function. The stakeholders can be mapped in a Power-Interest-Matrix (see Figure 1 earlier in the paper), where they are categorised as either "minimal effort", "keep informed", "keep satisfied" or "key players". This leads to appropriate treatment strategies. If a stakeholder is in-between categories the project team has to decide how this stakeholder is to be classified.

Understanding the expectations and potential actions of key stakeholders, based on an understanding of their power and interest in the project, is clearly an important issue. Equally important is to gain an understanding of the risks which could arise out of the stakeholders' expectations and possible actions. Especially where risks are related to threats and there are situations where a stakeholder engagement strategy fails. Then expectations are not perceived as having been met and stakeholder actions are taken that work against the best interest of the project. On the flip side of the same coin there are also situations in which risks are related to opportunities. Expectations may be exceeded, presenting the prospect of a stakeholder contributing above and beyond that originally envisaged for the good of the project.

To assist the management of risk the two dimensional interpretation of stakeholders might be not sufficient in order to increase opportunities and to decrease threats. More transparency can be added to the Power-Interest-

Matrix through using a third dimension. In this case the authors propose the attitude of the stakeholder as a third dimension, because the attitude can reflect whether the stakeholder is supporting or opposing the project. Stakeholder attitude can be categorised as positive, neutral or negative. This will help in identifying possible threats or opportunities, i.e. risk identification, as part of the formal project risk analysis and management process. The result of adding this third dimension to the Dornier Museum is shown in Table 2.

Table 2: three dimensional Stakeholder Analysis [3dSA]

Stakeholder	***Power****	***Level of interest****	***Attitude***	
			Actual	***Desired***
Client	*5*	*5*	*1*	*1*
Public authorities	*5*	*4*	*3*	*3*
Project Management	*3*	*5*	*2*	*2*
Aerospace Foundation (sponsor)	*2*	*3*	*2*	*1*
Operator	*1*	*3*	*2*	*2*
Architect	*2*	*4*	*3*	*1*
MEP Planners	*1*	*1*	*3*	*2*
Contractor	2	1	*3*	*2*
City	4	2	*2*	*1*

**** 1 = none … 5 = very high***
***** 1= very positive; 2=positive; 3=neutral; 4=negative; 5= very negative***

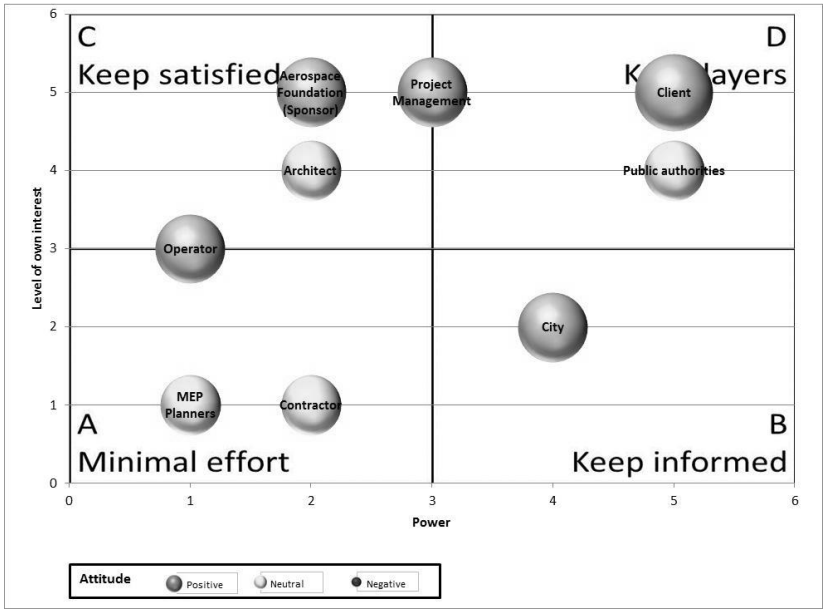
The authors distinguish the third dimension in terms of actual and desired attitude. The actual attitude shows whether the stakeholder has a negative, neutral or positive impact on the project objectives, i.e. will possibly lead to risk. The comparison between desired and actual attitude helps in proactively managing the risks related to the stakeholders. If the stakeholder does not hold the desired attitude then the project management function needs to develop an appropriate treatment and engagement strategy.

As mentioned above, a risk can be a potential benefit or a potential threat. The usual focus of project risk management is on mitigating the negative aspects of risk i.e. the threats to the project. In this section the usefulness of the adapted stakeholder analysis matrix in Table 2 will be illustrated by reference to the less common focus, which is on the positive aspects of risk i.e. the opportunities that are presented during the undertaking of the project. The fact that the construction project is a museum outside the city centre, results in a building which contributes to the social environment in a positive way. Therefore this project holds as many opportunities and benefits to its stakeholders as disadvantages and potential threats. Hence

one key aim of risk management in this particular case is to identify and exploit possible opportunities. Furthermore showing the positive perspective of risk emphasises the importance of this oft-neglected aspect of project risk analysis and management.

The qualitative numerical values for the dimension Attitude shown in Table 2 were generated through discussion with the project team of the case study. The three dimensionality of the tool can be visualised with the 3dSA diagram shown for the Actual Attitude in Figure 2.

Figure 2: 3dSA-Diagram for Actual Attitude



The third dimension, Actual Attitude, is represented by the size of the ball, which shows if the stakeholder has a positive or negative attitude towards the project. Therefore the attitude shows if opportunities or threats are linked to that particular stakeholder. The basic principle behind the 3dSA diagram is the bigger the ball the higher the opportunity. This can also be done for the desired attitude as well in a separate diagram. Hence, after the stakeholders have been mapped, the project team has an enhanced level of understanding of their salience and is better able to decide on appropriate engagement strategies.

To illustrate the use of the diagram we consider the example of the public authorities. The traditional approach classes this stakeholder as a Key Player, as they have high power and high level of interest. On this basis they would require time and effort in terms of engagement activities. However the public authorities have a neutral Actual Attitude towards the project, which is similar to that what the project team expects. The only thing required by the public authorities is that the project complies with the stipulated laws and regulations of the city and urban authorities. Assuming that the public authorities have neutral attitude towards the project means they will ensure a fair treatment. Hence, whilst this stakeholder is a key player in the traditional analysis, it is enough to keep them satisfied because they do not hold any potential threats or opportunities for the project. As a result, an appropriate engagement strategy for this stakeholder is to ensure the project complies with the laws and regulations, if necessary hiring a consultant in order to achieve this compliance. Thus the use of the 3dSA has provided a different perspective on stakeholder salience, with the conclusion that the engagement with this stakeholder is handled in an effective and efficient way. More intensive engagement would be required if the public authorities have a negative attitude towards the project (though this is not the case in the case study as it involves a museum outside the city centre).

A second example is the Sponsor (Aerospace Foundation). As shown in Figure 2 they have a positive attitude towards the project. They expect more recognition and interest in their organisation through the museum. They want to have areas in the museum where they can do promotions and advertise their institution, in order to get more members and donors. In the traditional Power-Interest-Matrix this stakeholder is classified as ‘keep satisfied’ (high interest/low power). But there are major potential opportunities in deeper engagement with this stakeholder in the operational phase of the project. For instance it might be that the museum needs new funds for refurbishments, expansions or new exhibition materials. Therefore the project team desires a very positive attitude from stakeholder towards the project, in order to be able to maximise eventual opportunities for the future. Hence, actively engaging with the stakeholder during the project execution might result in a closer relationship, which might be beneficial to the project. Factoring in a highly positive attitude from the 3dSA diagram, this stakeholder can be viewed as a Key Player during the operational phase. The project team should try to create a strong relational foundation during the project execution, in order to increase the potential benefits during operation. A possible engagement

strategy could be to make use of a quarterly project newsletter, where the current and expected status of the project is illustrated (such a strategy is typically used for engaging with important stakeholders). Another engagement strategy is to enable site visits by the Sponsor. Such active engagement with elements of the project will give the Sponsor the feeling that they are important part of the whole activity.

5 Conclusion

To conclude, this paper proposes a modified tool for analysing project stakeholders, with the aim to create a stronger link between risk management and stakeholder analysis. The tool categorises stakeholders in three dimensions rather than in two, as is typically done in current practice. The resultant method is called the "three dimensional stakeholder analysis", in short, the 3dSA. The Attitude of the stakeholder towards the project is the third dimension; with attitude differentiated between actual and desired. Attitudes can be positive, neutral or negative towards the project aims and objectives, and can therefore reflect risks which can arise out of stakeholders' behaviours and intentions. Through the comparison between actual and desired, the resultant risks can be managed proactively, rather than reactively in a crisis management approach.

The decision about which dimensions should be emphasised i.e. power, level of interest or attitude, is dependent on the project circumstances. A degree of flexibility and discretion is required by the project team in using the tool. In the illustrative example of the Dornier Museum presented in the paper the project team confirmed that the 3dSA tool creates a better understanding of stakeholders to the project. Also that it reflects the risks, in terms of both threats and opportunities, associated with the stakeholders. Hence it was perceived as a useful tool in supporting the development of the stakeholder engagement strategy.

The limits of the tool are related to its usage in practice. Stakeholder analysis has always been practiced, but often not in a detailed and formalised way. Therefore the tool might be perceived as nothing new, just a formalisation of what is already practiced. Therefore there needs to be a will to make stakeholder analysis an on-going and formal project management activity, complementing invaluable informal engagement processes.

Further work is required in developing the 3dSA. For example, research is needed in order to define universal analysis dimensions for different types of projects. The validity of the tool could be tested through further in-depth case studies. Stakeholder analysis is typically practiced in a qualitative way, which produces data that are related to subjective opinions. To mitigate the subjective interpretations of the 3dSA, work could also focus on methods for quantifying the stakeholders against the dimensions. This might result in more objectivity in terms of the output from the stakeholder analysis process.

References

Al-Bahar, J., and Crandall, K. (1990). Systematik Risk Management Approach for Construction Projects. *Journal of Construction Engineering, 116*(3), 533-546.

Association for Project Management. (2006). *APM Body of Knowledge* (5th ed.). Buckinghamshire: Association for Project Management.

Bourne, L., and Walker, D. H. (2005). Visualising and mapping stakeholder influence. *Management Decision, 43*(5), 649-660.

Brugha, R., and Varvasovszky, Z. (2000). Stakeholder analysis: a review. *Health Policy and Planning, 15*(3), pp. 239-246.

Celar, S., Turic, M., and Vickovic, L. (2010). 4DSA: 4-Dimensional Presentation of Stakeholder Analysis in Large Software Project. *21st International DAAAM Symposium* (pp. 3-4). Vienna: DAAAM International.

Chapman, C. (1997). Project risk analysis and management-PRAM the generic process. *International Journal of Project Management, 15*(5), 273-281.

Chinyio, E., and Olomolaiye, P. (2010). 1 Introducing Stakeholder Management. In E. Chinyio, and P. Olomolaiye, *Construction Stakeholder Management* (pp. 1-12). Chichester: Wiley-Blackwell.

Eccles, R. G. (1981). The quasifirm in the construction industry. *Journal of Economic Behavior and Organization, 2*, 335-357.

Freeman, R. E. (1984). *Strategic Management: A Stakeholder approach.* Boston: Pitman Publishing.

Gann, D. M. (1996). Construction as a manufacturing process? Similarities and differences between industrialized housing and car production in Japan. *Construction Management and Economics, 14*(5), 437-450.

Garnett, N., and Pickrell, S. (2000). Benchmarking for construction: theory and practice. *Construction Management and Economics, 18*(1), 55-63.

Gidado, K. (1996). Project complexity: The focal point of construction production planning. *Construction Management and Economics, 14*(3), 213-225.

Girmscheid, G. (2006). *Strategisches Bauunternehmensmanagement- Prozessorientiertes integriertes Management für Unternehmen in der Bauwirtschaft.* Berlin: Springer Verlag.

Ihlen, O., and Berntzen, O. (2007). When lobbying backfires balancing loby efforts with insights from stakeholder theory. *Journal of Communication Management, 11*(3), 235-246.

Institute of Risk Management, Association of Insurance Managers, and National Forum for Risk Management in the Publicn Sector. (2002). *A Risk Management Standard.* London: IRM.

International Organisation for Standardisation. (2009). *ISO 31000: Risk Management- Principles and Guidelines.* Geneva: ISO.

Johnson, G., Scholes, K., and Whittington, R. (2005). *Exploring Corporate Strategy.* Harlow: Pearson Education.

Leung, M., and Olomolaiye, P. (2010). 6 Risk and Construction Stakeholder Management. In E. Chinyio, and P. Olomolaiye, *Construction Stakeholder Management* (pp. 75-98). Chichester: Wiley-Blackwell.

Miller, K. D., and Bromiley, P. (1990). Strategic risk and corporate performance: An analysis of alternative risk measures. *Academy of Management Journal, 33*(4), 756-779.

Murray-Webster, R., and Simon, P. (2006). Making Sense of Stakeholder Mapping. *PM World Today, 8*(11), 1-5.

Olander, S., and Landin, A. (2005). Evaluation of stakeholder influence in the implementation of construction projects. *International Journal of Project Management, 23*(4), pp. 321-328.

Perry, J., and Hayes, R. (1985). Risk and its management in construction projects. *Proceedings of the Institution of Civil Engineers Part1, 78*(3), 499-521.

Pinto, J. K., and Covin, J. G. (1989). Critical factors in project implementation: a comparison of construction and RandD projects. *Technovation, 9*(1), 49-62.

Project Management Institute. (2008). *A guide to the project management body of knowledege (PM Guide)* (4th ed.). Pennsylvania: Project Management Institute.

Reed, M. S., Graves, A., Dandy, N., Posthumus, H., Hubacek, K., Morris, J., et al., (2009). Who's in and why? A typology of stakeholder analysis methods for natural resource management. *Journal of Environmental Management, 90*(5), pp. 1933-1949.

Roy, G. G. (2004). A Risk Management Framework for Software Engineering Practice. *Australian Software Engineering Conference (ASWEC'04)* (pp. 1-8). Perth: IEEE Computer Society.

Schwarzkopf, D. L. (2006). Stakeholder Perspectives and Business Risk Perception. *Journal of Business Ethics, 64*(4), 327-342.

Slack, N., Chambers, S., and Betts, A. (2006). *Operations and process management-Principles and practice for strategic impact* (2nd ed.). Essex: Pearson Education.

Sparrevik, M., Ellen, G. J., and Duijn, M. (2011). Evaluation of Factors Affecting Stakeholder Risk Perception of Contaminated Sediment Disposal in Oslo Harbor. *Environmental Science and Technology, 45*(1), 118-124.

Tah, J., and Carr, V. (2001). Knowledge-Based Approach to Construction Project Risk Management. *Journal of Computing in Civil Engineering, 15*, 170-177.

Thompson, M. (2010). 4 Uptake, Applications and Best Practices in Stakeholder Management. In E. Chinyio, and P. Olomolaiye, *Construction Stakeholder Management* (pp. 56-64). Chichester: Wiley-Blackwell.

Varvasovszky, Z., and Brugha, R. (2000). A stakeholder analysis- How to do (or not to do). *Health Policy and Planning*, pp. 338-345.

Wang, S. Q., Dulaimi, M. F., and Aguria, Y. (2004). Risk management framework for construction projects in developing countries. *Construction Management and Economics, 22*(3), 237-252.

Weiss, J. W. (1998). *Business Ethics- A Stakeholder and Issues Management Approach.* Orlando: The Dryden Press.

Williams, B. L., Brown, S., Greenberg, M., and Kahn, M. A. (1999). Risk Perception in Context: The Savannah River Site Stakeholder Study. *Risk Analysis, 19*(6), 1019-1035.

Winch, G. (1989). The construction firm and the construction project: a transaction cost approach. *Construction Management and Economics, 7*(4), 331-345.