

# VALUE-BASED MANAGEMENT IN THE SUPPLY CHAIN OF CONSTRUCTION PROJECTS

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## ABSTRACT

The scope of this paper is to examine the idea of using the management philosophy Value-Based Management (VBM) as a supplementary management tool to control the total building process in a more efficient manner compared with conventional procedures. VBM has been used as a successful management tool inside independent companies for several years, but we want to test this tool in a building organization, i.e. an organization where different companies work together to define and build a unique building. In this paper the approach will mainly be theoretical and aimed at preparing a methodology for practical use in a building organisation. The idea has subsequently been used in a concrete building process, and the results from this project are explained in another paper. The result of the theoretical approach in this paper lead to a well-founded hypothesis stating that the supplementary use of VMB in a project organization with different legal parties can be a more proactive control tool, i.e. the management get an earlier warning if the process go off the rails compared with traditional control mechanisms.

## KEY WORDS

Value, Value Management, Value-Based Management, Human behavior, Community, Congruity.

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## **INTRODUCTION**

One of the main ideas of Lean Construction is to remove waste and achieve higher value for the construction client. This is among other methods applied through management **of** values. But since the term value has not yet unambiguously been clarified, we cannot be sure that value management has been developed to its full potential. The term value is, therefore, examined in this paper, and a theoretical framework for one kind of value management is applied, Value-Based Management (VBM). The difference between the philosophies of Value Management and VBM must initially be pointed out.

Value Management is employed when management of primarily product values defined by the construction client and other relevant parties is used. This is what Lean Construction applies in the value part of the TFV theory. VBM is an extension of Value Management and, furthermore, applies process values as means for achieving higher product values. The differentiation is due to the difference in management **of** values and management **by** values, i.e. goals and means.

This paper is primarily based on literature studies but since Value-Based Management has only recently been applied in construction projects, the specific literature in that area is weak. Therefore, inspiration has been found in social science and other manufacturing theories.

The principal result of this paper is a clarification of the term value and its use in Lean Construction. In addition it is examined why a change to the more holistic approach of VBM would be desirable, and finally these ideas are assembled into the context of construction projects.

## **METHOD OF INVESTIGATION**

This paper explores the theories behind Value-Based Management and the concept of value. A link to Lean Construction is hereafter made. The paper is primarily based on literature studies.

In this content, Value-Based Management has only recently been systematically applied in a construction project, where action research was carried out. The specific literature in that area is weak, and inspiration is therefore, found in social science and other manufacturing theories where VBM has been applied with success.

## **THE VALUE CONCEPT**

Values have always been used in construction in one manner or another, but not consistently due to lack of a definition of the term. In most construction projects values (needs/goals/expectations) are developed and described in the brief. The achievement of these values, determined by the construction client and sometimes the users, is always the primary objective for a construction project. There are basically two variations of the described value; utility value and market value. Utility values are associated with the technical and aesthetic construction and the use of the construction, e.g. brick type, top lighting, color, usability, flexibility, etc. Market value is closely connected with the utility value. It describes the value of utility, quality in money and is closely related to demand. All private organizations have as their main purpose to gain an acceptable income that can secure

future existence as well as meeting the expectations of the stakeholders, and this is done by supplying a demanded product. This will never be changed in a world dominated by market economy, and market values will, therefore, always be superior to the others. Because of the described connection, these two values will afterwards be referred to only as product value.

Basically, there is nothing new in product value, it has been an object of construction management for many years and is actively seen in such management philosophies as Economical Value Added and Value Management.

## LEAN CONSTRUCTION AND THE VALUE CONCEPT

Lean Construction (LC) views construction as a production, and the management viewpoints are among others described by Koskela's TFV concept (Koskela 2000). Value, in LC, is primarily what is described above as product value. Koskela (2000) undertakes a historical exploration of the use of the term value, and in his references value can be related to either market value and/or utility value. This perception of value is supported by the following quotes from LC conference papers.

- In Bertelsen & Koskela (2002) Value Management is described as, *“Conceptualization of production (from value viewpoint): As a process where value for the customer is created through fulfilment of his requirements.”*
- Later in the same paper, *“...the construction process generates the value wanted by the client.”*
- In Ballard & Howell (1998), *“Value is generated through a process of negotiation between customer ends and means.”*
- In Lindfors (2000), *“...products/services that increase profit, decrease time and cost, and improve quality for the company and generate profit/value for the customer.”*

This clearly shows that value is mainly conceived as both utility and market value, i.e. product value in Lean Construction. The same is valid for Lean Production, where Womack & Jones (1996) defines value as: *“A capability provided to a customer at the right time and cost, and defined by the customer.”* There is, though, an increasing tendency to consider value as more than only product value. Leinonen & Huovila (2000) mentions three different kinds of values; exchange value, use value and esteem value. The first two can be translated directly into market value and utility value. The third value has a broader scope than only the product-customer perception.

The main network for international publications of Lean Construction papers is the IGLC conferences and connected proceedings. A brief search on the use of the word “value” in the title or the keywords section of all app. 225 papers accessible through IGLC (2003) was made, and resulted in only 15 unique papers. 13 of these papers are from the last three years. On the basis of this, it can be concluded that there is still a lot of research to be carried out in the area of value and the management of it.

## PROCESS VALUES

In everyday life the term value is not always connected to the product or its use, but instead often to human behaviour. Every individual has a set of values, which they more or less consciously use as guidelines for their behaviour. This value is called ethical/personal value and is very subjective. Ethical value could be explained as an individual “bible” for what you perceive as good/bad and right/wrong, e.g. right manners.

This ethical value always occurs in connection with human behavior, which in management philosophies is related to the process. The value is, therefore, called process value. The exploration of value has now resulted in two values, as shown in figure 1.

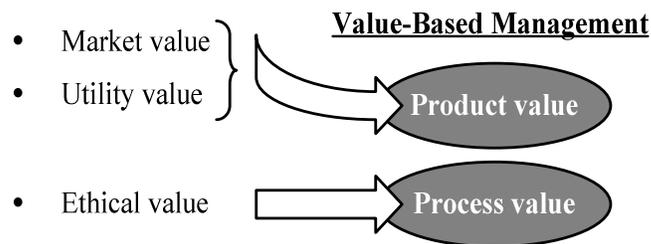


Figure 1: The two sets of values used in Value-Based Management.

## THE RELATIVITY OF VALUES

The increased focus on value generation is a new tendency in society, which began in the 1980s, and is part of the increasing attention to “soft” issues such as culture, ethic, quality, etc. H. Fink, a professor in moral and philosophies, once stated the following view on value at a conference (extraction of the speech, Fink 2002).

- *“Value is certain forms of characteristics, not substantive quantities. To create value is not to create products, but products with certain characteristics and qualities.”*
- *“Value is essentially comparative. Goods do not have value each on their own. Goods only have value in comparison with other goods, e.g. there could not be good houses if there weren’t bad houses.”*
- *“The meaning of seeing the organization of construction in a value generation perspective must be to become better not to forget something important, and not to focus biased on few parameters, so other important ones are forgotten. What you do badly is still bad even though you do some other things well.”*

Fink (2002) talks here about product value and states that value only has a meaning in the comparison of goods. This is very interesting as it basically means that we cannot avoid constructions (products) with low value, we can only make the worse better! The conclusion is that value is a relative matter, but still value is subjective to the individual human being. The same is valid for the process value, i.e. ethical value, where you can only say that a behavior is wrong when you have a perception of which behavior is right.

The value concept has now been explored, and in the next part of this paper one method for management **of** and **by** values, Value-Based Management, will be described. The interesting discussion of how value is determined, how it is perceived, and value for whom will be continued later in this paper.

## THE BASIC THEORY OF VALUE-BASED MANAGEMENT

The core of VBM is the influence on human behavior. Human behavior in construction is associated with the activities needed to construct. These both include craftsmanship and the work done by managers. A model for this is shown in figure 2.

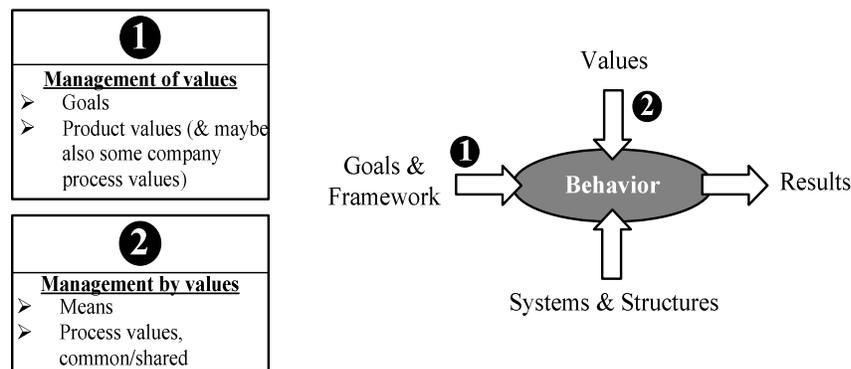


Figure 2: Behavior regulation in Value-Based Management.

The objective of VBM is to achieve consensus between the results and the goals. The product is built in the process, and the process is primarily undertaken by human craft which is controlled by the individual's behavior.

Two kinds of value management can be extracted from figure 2: Management **by** values and management **of** values.

### MANAGEMENT OF VALUES

Management of values primarily uses product values. It seeks maximization of the values delivered to the customer plus increasing marginal profit for the construction partners and is identical to the term *Value Management* in Lean Construction (Bertelsen & Koskela 2002). According to figure 2, management of values, and thereby product values, is described and managed through the goals (e.g. described in the clients brief) and controlled by systems and structures.

### MANAGEMENT BY VALUES

Management by common agreed (shared) values uses process values as a supplementary mechanism to manage and control human behavior. Process value is called values figure 2. It is then notable that process values can be perceived as means for the goals, e.g. product values. In some cases means can, furthermore, be a part of the goals for some of the interested parties. Some of the goals in management **of** values can be company-like process values, but they are from the beginning looked upon as individual interested party goals.

## VALUE-BASED MANAGEMENT

Therefore, VBM could basically be perceived as a combination of both management **by** and **of** values. Since management of values is not new to construction, this paper primarily focuses on management by values. Thus, it is also recognized that management of values in today's construction is far from perfect.

In the following it is explored why values can be used as a management instrument for changing human behavior and thereby improve the product built as a result of the process.

## THE NEED FOR MORE FOCUS ON PROCESS VALUES

Authorities in industrialized countries compose rational (behavior-) regulation in an attempt to get the organizational partners to comply with the norms for participants in a society where individual democratic freedom and market economy constitute the framework. It is well accepted that authorities must regulate to secure social interests. The regulation is done in a manner so everything is formulated exactly and any situation is incorporated. This has its origin in the 17<sup>th</sup> century rationalism, which is a philosophy, where everything is self executing but not necessary righteous (Jensen 1998). In accordance to figure 2, this rational regulation only influences behavior through framework. Some examples of this in construction could be contracting between partners, tendering in governmental construction<sup>3</sup>, health and safety regulation, etc.

The amount of regulation is now so comprehensive and fast changeable that companies have difficulties disposing and acting accordingly. This has generated a narrow-minded economical attitude among companies that business moral is a matter of following the regulation and by the way neglect to do so when it is payable in a short-term individual benefit calculation (Jensen 1998). People tend to lean upon authority and, thereby, only act when instructed and not take responsibility if they are not directly involved. This has reduced individuality and morality among actors in society (Petersen & Lassen 1997). In a construction context, this influences all levels of the project organization both vertically and horizontally. The craftsmen feel no obligations to help others outside their trade, and the managers take no responsibility for the craftsmen's work. A shift from the present rational behavior regulation towards more individual responsibility for the benefit of the community is desirable.

To understand human behavior, a short description of community and its regulation is required. Every construction project can be viewed as a community, where the partners participate to fulfill needs. Most people participate in several communities, e.g. their workplace, family, sport clubs, political organizations, etc. in the quest for fulfillment of needs. Maslow (1968) has categorized the needs in such a manner that body needs must be fulfilled before security needs, social needs, ego needs and self actualization.

The needs are then fulfilled through participation in communities, e.g. construction projects and the companies involved. This is an important fact in the theory of VBM. Every human has only one set of values, and the idea is then to create congruity between the individual's values and the values of the community, e.g. a construction project organization.

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<sup>3</sup> In Denmark there are special regulations concerning governmental or governmental supported constructions, e.g. supplementing rules for tendering, quality, logistics, and economics.

In communities, regulation is also present, called the community conditions. The purpose of this is to weigh the individual's interest against the interest of the community. The community conditions attempt to fulfill the individuals' needs without unjustifiably deducting the remaining participants' opportunities to fulfill their own needs (Jensen 1998). To prevent individuals from fulfilling their own needs at the expense of the community, every action should be regulated to create a net advantage in contribution to the community goods. This leads to the basic condition of community:

*“As a participant in a community under the framework of an unregulated social space, there can be a short-term individual advantage by acting against the collective long-term interest in the preservation of the common goods and the community itself”* (Jensen 1998).

From this at least three serious problems in community regulation can be extracted (Wandahl 2002):

- Controlling the unregulated access to limited common resources in a community.
- An impression of having rights without a corresponding sense of responsibility.
- Communities exists with the purpose of fulfilling individuals' needs and in that connection there tend to be a problem concerning measuring the contribution from the individual to the community.

These problems are easily recognized in construction projects. The problem with impression of having rights without a corresponding responsibility is known to all who has been in touch with management. The problem of measuring the contribution to the community is especially known in partnering projects, where inducement agreements are used in the quest to prevent this.

The main problem regards the individual's responsibility for the community, e.g. construction projects. To make it further complicated, the choice of action or strategy is dependent on other individuals' choices. This is often called the prisoners' dilemma, which is show in figure 3.

		Part "B"	
		Cooperate	Defect
Part "A"	Cooperate	A=3 / B=3 Reward for mutual cooperation	A=0 / B=5 Sucker's payoff, and temptation to defect
	Defect	A=5 / B=0 Temptation to defect and sucker's payoff	A=1 / B=1 Punishment for mutual defection

Figure 3: The prisoner's dilemma (Axelrod 1986).  
Effect of strategy is dependent of the other parts strategy.

In a cooperation, partners need to have the same basis for making their choices to gain the effect of positive synergy as shown in the upper left corner of figure 3. In VBM this basis is the common set of values. In Neuro Logistic Programming, NLP, a model for levels in our

personality is used. A higher level mainly influences the lower levels<sup>4</sup>, and in that sense it is important to work on as high a level as possible. This is shown in figure 4.

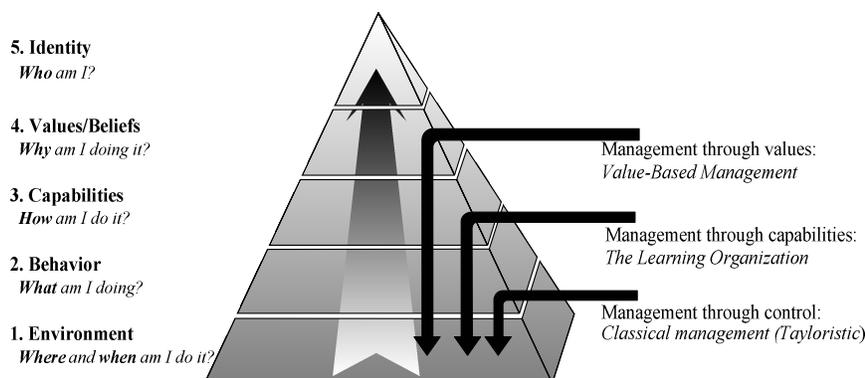


Figure 4: Logical levels in NLP, and the level of work through VBM. Own further rework of Hauen et. al (1999) and Dilts (1995).

VBM has a high impact on changing behavior because it starts at the fourth level. The more classical approach to management, e.g. distribution of task, control and sanction, works on a lower level and has basically no effect on personal capabilities and values/beliefs.

## ADAPTING AND CONVERTING THE THEORY INTO THE CONSTRUCTION CONTEXT

VBM should not be considered as a full substitution for other management systems, i.e. quality, cost, but instead as a supplement. VBM is not and will never be used as a stand alone management philosophy neither in manufacturing industries nor in the building industry. It is meant to be an addition to other philosophies, e.g. Lean Construction, SCM, etc. and it is reminded that the main purpose of VBM is to create higher product values by means of process values.

### THE PERCEPTION OF VALUE

As process values are very subjective, the perception of them differs. The importance of process and product values for different groups of partners in a construction project is shown in figure 5.

The works on the construction site are a main part of the building process, and workers care mostly about the process values, e.g. good cooperation, agreement discipline, communication, etc. and of course also their income. The end users are going to live or work in the constructed building, and they, therefore, care mostly about the product values, e.g. brick type, roof light, flexibility, economy, architecture, etc. This hypothesis is shown on figure 5 and has been proven in one construction project, where measurement resulted in the same tendency (Wandahl 2002). It is a paradox that the workers in general practice care mostly about process values, but it is those who add value to the final product. Thus, the

<sup>4</sup> This rule is not universal, e.g. if you give a craftsman a truck certificate it is not evidential that he starts driving trucks.

workers do not neglect product values. Basically workers are proud people and like to make good craftsmanship **IF** the conditions allow it. In that sense is VBM also about managing by the process values, so the value of the product can increase.

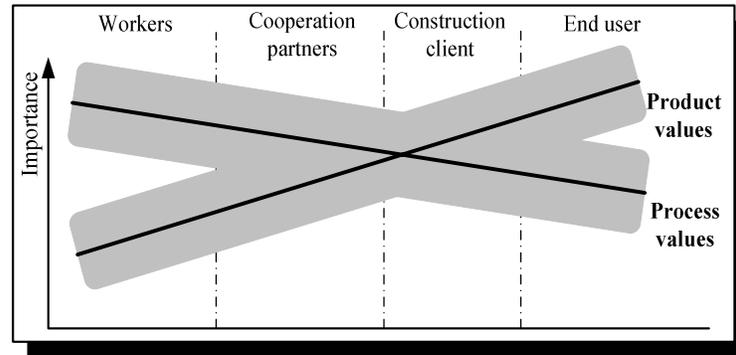


Figure 5: Difference in perception of values (Wandahl 2002).

There are many interested parties in a construction project, and it is, therefore, not clear for whom we shall create value. In the next part the answer to this will be given.

### WHO ARE THE CUSTOMERS?

Traditionally, the construction client is considered the customer of the construction process. This is rational in the sense that the construction client is the one who defines the product values and finally pays for it all. It is understandable that the main goal for any construction projects is to fulfill the needs of the client. But the building industry as a trade needs to do more than fulfilling buyer's needs; each company must secure their own future existence by gaining a net profit. Therefore, you can ask: Has this construction been advantageous for the contractor? And what about the consultants? Koskela (2000) discusses this and realizes that there are internal customers in the supply chain and quotes Ishikawa (1985) for saying: "*I invented the phrase 'the next process is your customer'...*". However, Koskela (2000) exclude the internal customer because he concludes they should be subordinate to the external customer.

VBM uses the internal customer of the supply chain of construction projects. In this way the supply chain acts more like a strategic team. This idea is widely used in other manufacturing industries (Johansen & Kragh-Schmidt 1999).

In VBM this is carried out by creating common process values, which all participants agree upon. These values could be good cooperation, communication, agreement discipline, etc. and they are followed up by a description of best practice (Bejder & Wandahl 2003). The product values are still defined to be the needs of the construction client, the final end users and in partnering projects also by other interested parties of the construction process.

### CONGRUITY PROBLEMS IN THE VALUE DETERMINATION PROCESS

In the value determination process both party individual product values and common/shared process values must be determined. In both cases they will be decided through a series of workshops in the brief phase. These values should then be applied in the rest of the

construction phases. As stated earlier this paper draws only secondary concerns to the product value and the generation and management of it. For further information on this issue, the reader is advised to seek other literature, such as Koskela (2000) where a model of value generation is demonstrated, or Bertelsen et. al (2002), which gives a practical approach to generation of product values.

As process values reflect personal values, a problem of congruity arises in the process of defining these. This is illustrated in figure 6

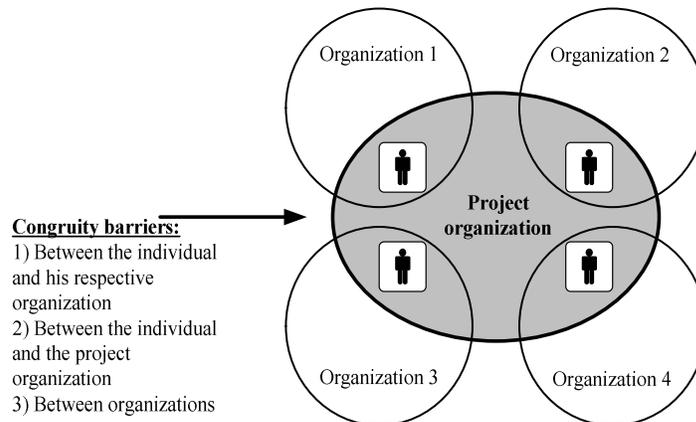


Figure 6: Congruity barriers.

The construction project should have a common set of values, but barriers arise due to the participants' own sets of values. A congruity across the barriers must be formed as this is one of the main pillars in VBM (Hauen et. al 1999). It is not necessary to obtain 100% congruence between the project organizations values and the individual's values, as long as the individual's values are not directly conflicting. The congruity should be seen in the light of the theory of community, as described earlier.

A main concern of the congruity barriers is when construction participants leave the organization, and when new one enters. This is a known problem in the building industry, where it is often seen that the general contractor moves his craftsmen around between different sites in different projects. VBM is still dependent on a constant workgroup but, furthermore, provides some tools for minimizing the congruity barriers if new participants should enter.

### **BENEFITS OF MANAGEMENT BY PROCESS VALUES**

VBM is thought as a more proactive management system compared with traditional systems. Traditional management systems used in construction tend not to be proactive because of the relatively late and limited interaction between the control activities and the action activities. Such systems could be related to quality, financial, time aspects etc. As shown in figure 7, the main idea of VBM is to fulfil the product values determined by the construction client/end users, and this is done more proactively by using process values as means.

An ultimate simple management/control system has only the first and the last bold arrows. Since VBM is still in its early stage, tools and proofing methods have not been fully developed. In a nearly finished action research project (Bejder & Wandahl 2003), VBM has

been adapted, and tools and methods have been developed. A system was used for the evaluation and the measurement of observance and conceived importance of the process values. A project web handled the data. Schemes and illustrations were then used in workshops to evaluate whether the interested parties acted in accordance with the process values and underlying causes and improvement possibilities were discussed. The conclusions are primarily positive, and a more proactive management seems to be observed.

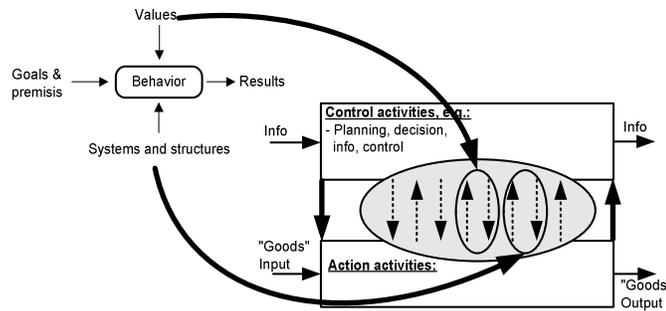


Figure 7: The proactive elements of Value-Based Management.

The more soft process values must be selected and implemented in the beginning of a project, when the complexity and importance of the chosen strategy is important. Later in the project, when everything is up and running we need a more industrialized workplace, to increase productivity. Then, the focus on process values is eased and management by systems & structures are increased. This is shown in figure 8.

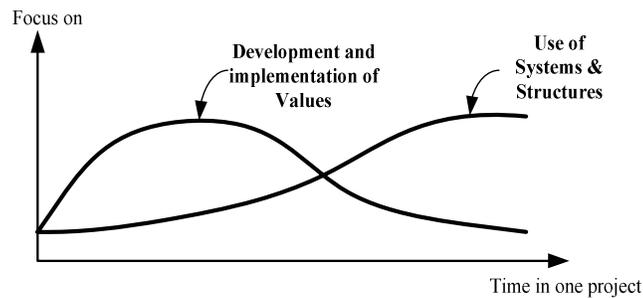


Figure 8: The use of values and systems & structures (Bejder 1989).

The model shown in figure 8 had in its original layout the two curves as cooperative structure and expert-orientation. The curves are only valid for one project at a time and handle the uniqueness of each construction project by using values as a management tool.

## CONCLUSION

The paper argues for and suggests a difference between Value Management and Value-Based Management and it is explained how one can distinguish between these definitions. Besides, in the pursuit of achieving higher effectiveness and efficiency, the possibilities of a systematic focus on the degree to which the interested parties act in accordance with the

commonly agreed shared process values in context with other production philosophies (e.g. Lean Construction and Supply Chain Management) are presented. Thereby, a supplementary new operational management tool is established, ready for practical tests and further development of construction processes. At the same time the hypothesis is argued that this tool can be more on the forefront of detecting series of events which takes a wrong turn. Coming action research experiments will be the next step in the further testing of this hypothesis.

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