

INCENTIVE SYSTEMS TO SUPPORT COLLABORATION IN CONSTRUCTION PROJECTS

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ABSTRACT

In Germany construction projects are based on traditional contracts with competitive bidding, which do not support collaboration. The behavior of non-cooperation results in a mass of claims and problems by the final inspection up to legal proceedings. Furthermore, the complex and dynamic environment as well as the asymmetric information between the participants of a construction project lead to uncertainty, which often ends in conflicts between contractor and client. To fight against the uncertainty a collaborative project environment based on an incentive system has to be built in order to share information and knowledge.

The theory of incentive systems mostly concentrates on material incentives particularly on financial incentives, while the intrinsic motivation of the participants has a very high impact of the project success. By reviewing the literature it can be hypothesized that the implementation of an incentive system consisting of monetary and non-monetary incentives will increase the total project performance. Therefore, this paper will focus on managing an incentive system to support the collaboration in a construction project in order to realize the optimal delivery of the project. In the end of the paper suggestions for further research are given.

KEYWORDS

Collaboration, incentive system, culture, trust

INTRODUCTION

To gain competitive advantage in a construction project a network needs to be built among the participating organizations which is stable and cooperative. According to Florence (1982) quoted by Macomber and Howell (2003) and Silvon et al. (2010) a project can be seen as a “network of commitments”. Thus, an incentive system can help foster collaboration and preserve the agreed upon commitments.

The concept of instituting an incentive system is not new. There are various forms of cooperative contracts in construction such as the Project Alliance Agreement (PAA) or Integrated Form of Agreements (IFOA). Darrinton and Howell (2010) state that relational contracts such as the IFOA support Lean projects while “incentives create a circumstance where cooperation better serve their economic interest than competing

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with others inside the project”. Furthermore, the IFOA contract includes financial incentives, where a percentage of savings will be paid to the project team according to their share of the degree of difficulty. The risk/reward payment of an alliance contract is linked by measuring the performance of the alliance using different Key Performance Indicators (KPI) of different Key Result Areas (KRA), which results in the Overall Performance Score (OPS) (Heidemann and Gehbauer 2010, Love et al. 2011). Both forms of contracts contain financial incentives to foster collaboration.

Laufer et al. (1981) research in their study financial incentives to enhance productivity on the construction site by using the Delphi technique. They concluded that financial incentives improve the workers motivation and the management quality resulting in an overall improved performance. The performance of every project participant depends on the capability and the motivation expressed by the willingness of the participant (Schulz 2000). The motivation of a person can be divided into intrinsic and extrinsic motivation. Intrinsic motivation is the motivation an individual gains out of the task itself whereas extrinsic motivation arises out of external incentives. Darrington and Howell (2010) hypothesize, that contract incentives which foster the intrinsic motivation are “highly relevant to the success of a Lean project”. In the literature it is often argued that financial incentives impair the intrinsic motivation of the recipient and lead to lower or a minimum of performance (Darrington and Howell 2010, Schulz 2000). In addition, Darrington and Howell (2010) point out principles which promote intrinsic motivation. One such principle assumed that trust-based incentives rather than mandatory incentives motivate a higher performance. Thus, the construction industry has to draw the attention to incentives which enhance the intrinsic motivation in order to increase the collaboration and performance successfully.

Lean Management views the whole project process rather than considering pieces of a process. For that reason and to manage the network of commitment the process management of a construction project has to be seen as a “mediating management putting cooperation, respect and compromise at the front [to involve everybody] on the same basis” (Bertelsen and Koskela 2002). In contrast, traditional contracts³ are inefficient as the participants maximize their own profit and do not maximize the value for the customer, because this kind of contract does not include incentives to foster the collaboration between the parties involved. Thus, this paper shows the importance of a working incentive system to foster collaboration between the project parties. Before a concept of managing an incentive system in a construction project will be introduced, first incentives and incentive systems⁴ will be defined and the requirements will be clarified by reviewing the literature.

INCENTIVES AND INCENTIVE SYSTEMS

Beyer (1990) says that an incentive is a stimulus which activates a certain behavior. Jost (2000) adds that incentives depend on the situation. Kuhl (2007) mentions an incentive as a link between stimulus and response. Furthermore, incentives can be positive or negative.

³ Traditional contracts are transactional contracts.

⁴ For basically information about motivation theory see Maslow, Herzberg, McGregor, McClelland.

By reviewing the literature it becomes obvious that there are different kinds of definitions of incentive systems. Wild's (1973) approach relates to the whole company. He defines incentive systems as deliberately designed working conditions, which activate a specific behavior. Rosenstiel (1975) adapts the idea of Wild (1973) and suggests that the organization itself is an incentive system. Thus, Rosenstiel (1975) categorizes incentives as financial incentives, social incentives, incentives of the work itself and incentives of the organizational environment. Becker's (1995) view is also based on Wild's (1973) approach. Becker (1995) understands the management system of an organization with all its elements as an incentive system in a broader sense. Brandenburg (2001) distinguishes between monetary and non-monetary incentives and adds the work environment to the incentive system. It can be noted that there exists a strong correlation between the effect of incentives and the need of the incentive recipient. The incentive system can be considered as efficient, if the benefits due to the incentive system are greater than any possible disadvantages. Thus, the appraisal of the incentive system depends on the objectives to be achieved (Kossbiel 1994).

By summarizing the literature there exist different definitions of incentive systems. In this paper an incentive system is defined as the sum of all used monetary and non-monetary incentives that foster the collaboration between the different construction parties. It can be argued that an incentive system is an instrument to achieve the objective of a project and requires any of the recipient valuable aspects of the contract and environmental conditions to foster collaboration. Therefore an incentive system has to be designed out of the circumstances and organizational structure of a project.

Aim of the incentive system is the motivation of the recipient. In a construction project the recipients are the different project parties such as the construction company, architect, engineer, project manager, and subcontractor. These parties should be motivated by the incentives of the incentive system to deviate from their actual uncooperative position to choose the cooperative strategy. To motivate the recipient the incentive needs to represent a value for the recipient (Kossbiel 1994).

PROJECT CULTURE AND PROJECT OBJECTIVE

In a construction project, different parties work together to promote the project. Every party has its own organization. And while different companies have different organizational structures and different internal firm processes, which are influenced by the cultural background of the organization, the project parties need to understand the roots of the different organizations to build strong and trustful relationships (Love et al. 2010). Such collaborative relationships can be fostered by incentive systems.

While incentive systems depend on the different organization cultures⁵ of the project parties, consequently two categories of organization cultures have to be examined that clash together in a project. The first one is the project culture the other one is the corporate culture of every party. Both cultures are necessary to support the implementation of an incentive system. The corporate culture of an organization depends on the business objectives of the organization (Rödl 2006). Consequently it can be asserted, that project culture and project objectives depend on each other. In

⁵ Organizational culture can be defined as a process of creation and development as well as the influence of cultural aspects within organizations.

addition it can be argued that the incentive system of a project organization depends not only on the objective and culture of the project but also on the objective and culture of several parties. Moreover Rödl (2006) declares that business objectives are formulated by an individual or a group thus they depend on the individual objectives. As a final point it can be said that project and business objectives are subjective values (see Figure 1).

Chen and Mohamed (2010) cluster the business environment in organizational environment which includes corporate culture, organizational climate, and technical environment (like the technological infrastructure). In their view an incentive system is part of the organizational climate. In their study the authors find that the construction industry should focus on managing experience-based and tacit knowledge by supporting the communication between the parties, while such knowledge extremely influences the performance.

Gehbauer (2008) refers collaboration as intelligent where every individual can compensate his knowledge gap out of the knowledge pool developed by all participants. To share knowledge a collaborative project culture has to be formed by the participants collectively. If not, the participants may feel dissatisfied with the project culture and be resistant towards the change process (Cheng et al. 2003). Das et al. (1993) identify the notion of “unsatisfactory interim cooperation” as relational risk. Consequently, collaboration requires a trustful environment, where the project objectives as well as the responsibilities have to be clearly defined.

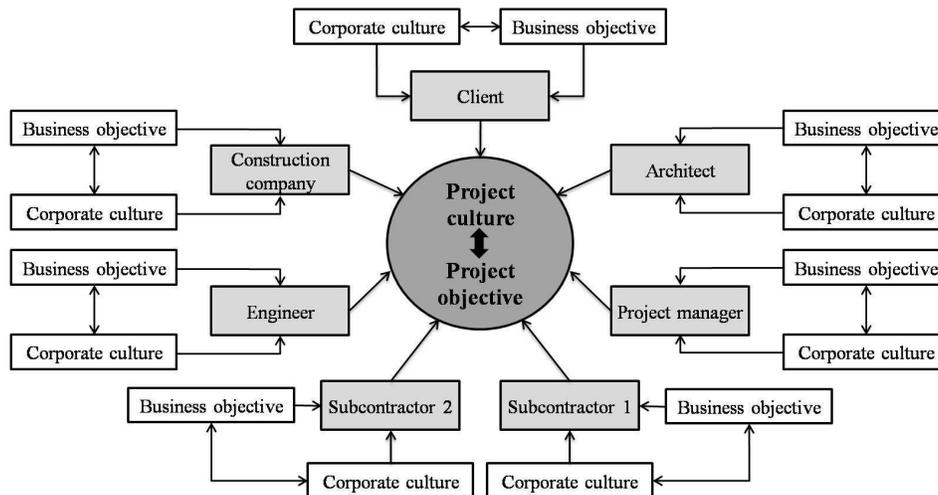


Figure 1: Construction project viewed as a network of corporate cultures

REQUIREMENTS AND CONDITIONS OF AN INCENTIVE SYSTEM

As mentioned above an incentive system should be designed to foster trust, which compensates the information asymmetries⁶ of the different parties. Rödl (2006) supposes that an incentive system can also create information asymmetry, which tends to non-cooperative behavior between the participants. This can happen, if the implementation will be done without knowing the requirement and condition of the

⁶ See Principal Agency theory.

incentive system. Hence, this section will give a short overview of the requirements and conditions of an incentive system.

The acceptance of the incentive system is influenced by many factors. To design, establish and implement an incentive system successfully the requirements of the incentive system should be known. According to Rödl (2006) and Laufer et al. (1981) an incentive system needs to be transparent and communicative, simple and easy to understand, objective, current (short period between action and reward), efficient including flexible, fair, compatible, controllable, tamper-proof, and has to be measured on group basis. Moreover Schulz (2010) adds the following criteria: holistic view of the recipient, value for the recipient as well as for the organization, time frame and valid, not only for one recipient but also for the group.

An incentive system is also influenced by the group size and age of participants. Marriott (1949) demonstrates in his study that the group size has an impact on the individual performance. The smaller the group size the greater the individual performance. Reasons for this finding are existing associations between the workers (knowing each other) as well as easier control of the group. Psychologists examine the effect of the age under three categories; socialization, economic wealth and apperception of deficit (Schulz 2010). Different groups have different requirements and older participants will need other incentives than younger participants. Like Maloney (1981) says “a program to improve motivation may not be effective in influencing the behavior of everyone participating in the program because of differences in their value, needs, expectations, attitude, past experiences, and personality”. Hence, the incentive system has to fit to the structure of the project organization and the subjective perception of the recipient.

MEASUREMENT OF PERFORMANCE AND COLLABORATION

Laufer et al. (1981) define the performance of an individual as a function depending on four factors: ability, motivation, role perception, and facilitating and inhabiting conditions not under control of the individual. Elmuti et al. (1993) itemize thoughtless decision, a lack of teamwork, poor communication and invisible leadership as Deming's (2000) demotivators of people and leads to low performance.

While the project environment is dynamic the incentive system requires flexibility. Consequently, the project objectives need to be translated into measurable indicators, KPIs, combined with benchmarks (Van Wassenaeer 2010). For managing the project objectives the Balanced Scorecard (BSC) can be used. The BSC was first introduced by Kaplan and Norton in 1992. The BSC consists of four perspectives: financial, customer, internal business processes, learning and growth. It needs to be determined if the four perspectives can be transferred to the Project Balanced Scorecard (PBSC) or if the PBSC should be expanded. The perspectives should be chosen in relation to the project objectives by defining the vision and strategies of the construction project.

Shelbourn et al. (2007) rank people (40%), business, process and procedure (34%), and technology (26%) by collecting 6 interviews (senior management) and 16 responded 5-point Likert scale questionnaires (construction workers) as the key strategies of an effective collaboration. Furthermore, they highlight six almost equally ranked critical key areas: good communication (22%), building trustful relationships (20%), shared vision (18%), clearly defined processes (16%), stakeholder engagement (15%), and well integrated technologies (10%). Love et al. (2010)

present three critical success factors (SF)⁷ of an alliance: management and support, knowledge and learning, and collaboration and cooperation⁸. The collaboration and cooperation factor includes open communication, mutual trust, effective coordination, team building and goal alignment. By planning the PBSC the project organization has to distinguish clearly between SF, KRA and KPI.

At this point it can be summarized that the human factor is the most important factor in the context of performance and collaboration. Thus, the project organization should not try to optimize the project without considering the human factor.

MANAGING INCENTIVE SYSTEM

An incentive system can help to build strong, trustful, and sustainable relationships between the construction parties. This section present a model to manage an incentive system in a project environment to foster collaboration between the construction parties viewed according to Bertelsen and Koskela (2002) as a transformation process of inputs into outputs (see Figure 2). Input of the transformation process is the incentive system with all monetary and non-monetary incentives to stimulate the participants of the different construction parties. During the process the input changes the non-collaborative behavior into collaborative behavior by setting the right incentives based on the project objectives, resulting in an increasing project performance (output) of the parties. While developing a relationship is an iterative process the incentive system has to offer the possibility to change if required. This possibility is represented by the feedback loop in the model.

INPUT

In addition to the project conditions and requirements the incentive system has to be planned and implemented in the construction project environment. The incentive scheme should include monetary and non-monetary incentives. Monetary incentives are incentives like wage, bonus, or benefit. In contrast to monetary incentives non-monetary incentives are those like work content, career opportunities, qualification, scope, social contact, social approval, job safety, or information excess (Przygodda 2004). It is often argued that non-monetary incentives are also monetary incentives as they can be quantified in money. Nevertheless, these incentives are non-monetary as recipients do not receive a financial reward.

The non-monetary and the monetary incentives can complement, compensate or oppose one another. Beyond, Deming (2000) mentions that monetary incentives have only short-term effect. Thus, the effectiveness of the incentive system has to be considered under the conditions and requirements explained above.

PROCESS

The incentive system leads to satisfaction, if the incentives present a value for the recipient. The motivation of the individual or project organization will activate and the behavior of the individual, group, and/or project organization will adjust from

⁷ Critical SF can be defined as the most important project objectives (Van Wassenaeer 2010).

⁸ Like Dillenbourg et al. (1996) problems are solved by the responsible participant in a cooperation. In contrast to cooperation problems will be solved together by all participants in collaboration.

non-collaborative to collaborative. Collaboration will increase the performance while information and knowledge are shared and the project can be delivered on time achieving quality objectives within the target costs.

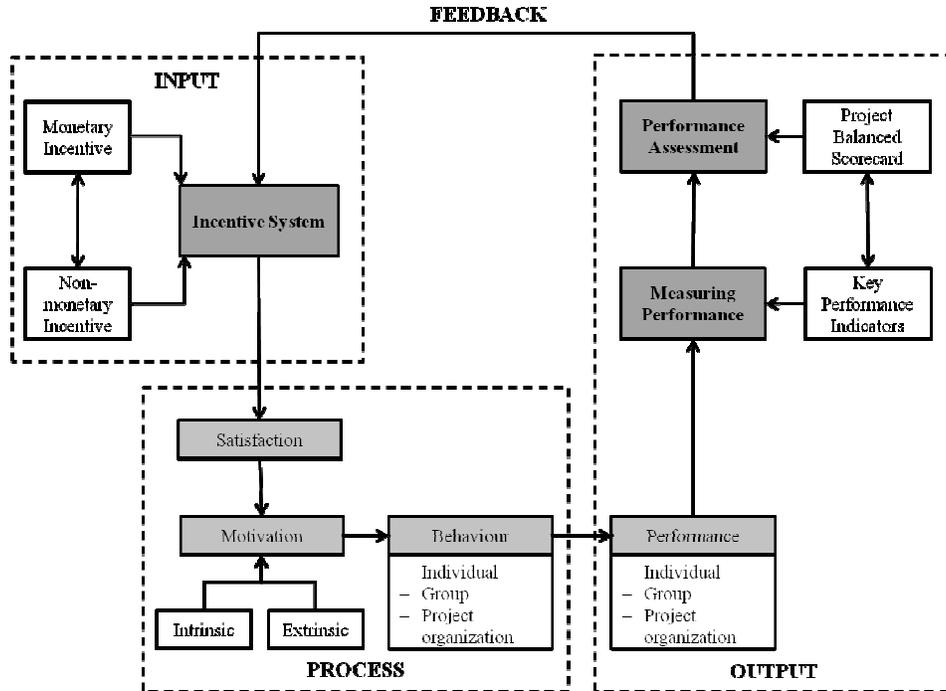


Figure 2: Managing incentive systems in a project environment

OUTPUT

The output of the transformation process is the collaborative performance. The collaboration performance can be quantified by KPIs to distribute the reward of the incentive. Incentives link the reward to scores in the various KPIs. KPIs have to be attached to KRA, be SMART (specific, measurable, attainable, relevant, and time related), effective, and simple to measure performance (Van Wassenaeer 2010).

Robinson et al. (2005) critically indicate that KPIs measured only past performances. According to the statement of Robinson et al. (2005) research should be done in order to find out if there are KPIs measuring the present or future performance or if KPIs are always measuring past performance. Deming (2000) says that measuring the individual or group performance tends to non-cooperation till high competition between the parties, as people gets ranked and judged. Thus, performance measurement should focus on the project objectives and the processes to achieve the objectives. The KPIs have to be formulated in relation to these findings. Furthermore, to improve the incentive system the process assessment has to be done continuously rather than after certain time periods.

FEEDBACK

To improve the incentive system a feedback-loop links the assessment of the output with the incentive system. The incentive system can affect the behavior of the

recipient under three categories of collaboration: collaborative (positive effect), neutral collaborative (no effect), and non-collaborative (negative effect). If the incentive system has a neutral or negative effect the incentive system needs to be adjusted to change the negative effect into a positive effect. If the incentive has a positive effect it can be used to intensify the effect in terms of the continuous improvement process (CIP). Therefore a feedback loop is necessary, which shows off the performance assessment and integrates the findings into the system.

The feedback loop in the model fulfills also one of the most important aspects in Lean Construction: the learning effect. The project team has the chance to learn from their performance and integrate the findings in future incentive systems.

CONCLUSION

Collaboration supports the optimal project delivery. This paper identifies the human resource as a key element to success. Therefore the construction industry should draw their attention to the human factor. The environment in the construction project is complex, uncertain, ambiguous (Pitsis et al. 2004) and dynamic. The supply chain is split into several pieces, knowledge and skills are allocated among various organizations (Rutten et al. 2009). Information asymmetry between the project parties and the lack of knowledge about the behavior of the involved participants leads to the Prisoners Dilemma and the individual decision-making process. These circumstances lead to non-collaborative strategies, resulting in a non-optimal project delivery. The situation can be turned around if the participants trust each other. Therefore a complete information and knowledge exchange is needed. Instead of bit-to-build an incentive system should be implemented and defined by the project parties to support collaboration. Thus, it is a prerequisite, that a project organization structure has to be established, where every construction party identifies their own corporate culture.

Furthermore, this paper gave a short introduction regarding incentives and incentive systems to support the collaboration between the construction parties. The connection between the corporate culture and business objective of the individual organization and the project culture and project objective was shown. The requirements and conditions of an incentive system were presented. Based on this knowledge a model to manage incentive system in project organizations was drawn. The conceptual model presented was developed under a theoretical framework. Empirical data has to be collected to prove the model. The first empirical data needed shows the priorities of the different participants in case of satisfaction and motivation.

In practice the participants must recognize the advantage of collaboration and be open minded and willing to join the collaboration. Every participant must be aware of that collaboration has a huge potential to minimize risks and maximize opportunities. The construction industry should recognize that “a bad project with an excellent Project Team [...] has a higher chance of being completed in a perfect manner than a “good” contract executed by a “bad” team” (Van Wassenae 2010). Focusing on the project team and using incentive systems to establish strong, trustful, and sustainable relationships is one of the basic requirements to deliver the project optimally.

SUGGESTIONS FOR FUTURE RESEARCH

It can be asserted that in construction projects incentive systems are based on monetary incentives. But why are incentive systems mostly based on financial

incentives? By reviewing the literature it was shown that non-monetary incentives are important. Thus, research is required in this area. Questions that have to be answered are: Which non-financial incentives foster collaboration? What is their impact? How to measure the success of the incentives? Beyond that, empirical data has to be collected and analyzed to prove if non-monetary incentives are more important than monetary incentives or the other way round. As stated above the project structure plays also an important role by designing and establishing an incentive system. For example, which impact does the age of the participants have? In this case one hypothesis which might have to be tested is, if younger participants are more motivated by non-monetary incentives? Hence, the influence of society towards value perception needs to be researched and analyzed for the construction industry.

Out of the feedback loop another research topic arises, the importance of adjusting the incentive system. How should the process of adjustment be managed to improve the incentive system? Which perspectives are important for the PBSC? Future research should also focus on performance management.

REFERENCES

- Becker, F.G. (1990). *Anreizsysteme für Führungskräfte: Möglichkeiten zur strategisch-orientierten Steuerung des Management*. Poeschel, Stuttgart.
- Bertelsen, S., and Koskela, L. (2002). "Managing the three aspects of production in construction." *Proc. of the 10th Annual Conference of the IGLC*, Gramado, Brazil.
- Beyer, H.-T. (1990). *Personalexikon*. Oldenbourg Verlag, München.
- Brandenburg, A. (2001). *Anreizsysteme zur Unternehmenssteuerung*. Deutscher Universitätsverlag, Wiesbaden.
- Chen, L., and Mohamed, S. (2010). "The strategic importance of tacit knowledge management activities in construction." *Construction Innovation*, 10(2), 138-163.
- Cheng, E.W.L., Li, H., Love, P.E.D., and Irani, Z. (2003). „Strategic alliances: A model for establishing long-term commitment to inter-organizational relations in construction." *Building and Environment*, 39(4), 459-468.
- Deming, W.E. (2000). *Out of the Crisis*. 3rd Ed., MIT Press, Cambridge, MA.
- Darrington, J.W. and Howell, G.A. (2010). "An optimized project requires optimized incentives." *Proc. of the 18th Ann. Meeting of the IGLC*, Haifa, Israel.
- Das, T.K., and Tenk, B.-S. (1999). Managing Risks in Strategic Alliances." *The Academy of Management Executive*, 13(4), 50-62.
- Dillenbourg, P., Baker, M., Blaye, A., and O'Malley, C. (1995). "The Evolution of Collaborative Learning." *Learning in humans and machines: Towards an interdisciplinary learning science*, P. Reimann, and H. Spada, eds., Pergamon, Oxford, 189-211.
- Elmuti, D., Kathawala, Y., and Wayland, R. (1993). "Traditional Performance Appraisal Systems: The Deming Challenge." *Management Decision*, 30(8), 43-48.
- Gehbauer, F. (2008). „Lean organization: Exploring extended potentials of the last planner system." *Proc. for the 16th Ann. Conference of the IGLC*, Manchester, UK.
- Heidemann, A., and Gehbauer, F. (2010). "Cooperative project delivery in an environment of strict design-bid-build tender regulations." *Proc. of the 18th Ann. Meeting of the IGLC*, Haifa, Israel.
- Jost, P.-J. (2000). *Organisation und Motivation: Eine ökonomisch-psychologische Einführung*. Betriebswirtschaftlicher Verlag, Wiesbaden.

- Kaplan, R.S., and Norton, D.P. (1992). "The Balanced Scorecard: Measures that drive performance." *Harvard Business Review*, 70(1), 71-79.
- Kossbiel H. (1994). Überlegungen zur Effizienz betrieblicher Anreizsysteme." *Die Betriebswirtschaft*, 75-93.
- Kuhl, J. (2007). Individuelle Unterschiede in Selbststeuerung. Motivation und Handeln, J. Heckenhausen, and H. Heckenhausen, eds., Springer, Berlin, 303-330.
- Laufer, A., and Borchering, J. D. (1981). „Financial Incentives to Raise Productivity.“ *ASCE, J. of Constr. Division*, 107(CO4), 745-756.
- Love, P.E.D., Mistry, D., and Davis, P.R. (2010). "Price Competitive Alliance Projects: Identification of Success Factors for Public Clients." *ASCE, J. of Constr. Engineering and Management*, 136(9), 947-956.
- Love, P.E.D., Davis, P.R., Chevis, R., and Edwards, D.J. (2011). "Risk/Reward Compensation Model for Civil Engineering Infrastructure Alliance Projects." *ASCE, J. of Constr. Engineering and Management*, 137(2), 127-136.
- Marriott, R. (1949). "Size of Working Group and Output." *Occupational Psychology*, London, 23, 47-57.
- Macomber, H. and Howell, G.A. (2003). "Linguistic action: Contributing to the theory of Lean construction." *Proc. of the 11th Ann. Meeting of the IGLC*. Blacksburg, Virginia.
- Maloney, W.F. (1981). "Motivation in Construction: A Review." *ASCE, J. of Constr. Division*, 107(CO4) 641-647.
- Pitsis, T., Kornberger, M., and Clegg, S. (2004). "The art of managing relationships in interorganizational collaboration." *Management*, 7(3), 47-67.
- Przygodda, I. (2004). „Immaterielle Anreizsysteme im Wissensmanagement." MOTIWIDI-Bericht Nr. 10, D. Ahlert, and S. Zeleweski, eds., Essen/ Münster.
- Robinson, H.S., Carillo, P.M., Anumba, C.J., and Al-Ghassani, A.M. (2005). "Review and implementation of performance management models in construction engineering organizations." *Construction Innovation*, 5(4), 203-217.
- Rödl, K. (2006). Auswirkungen von Unternehmenskultur und Unternehmenszielen auf die Gestaltung von Anreizsystemen. *Innov. Betriebsw. Forsch. u. Praxis*, Hamburg.
- Rosenstiel, L. von (1975). Die motivationalen Grundlagen des Verhaltens in Organisationen. Duncker & Humboldt, Berlin.
- Rutten, M.E.J., Dorée, A.G., and Halman, J.I.M. (2009). "Innovation and interorganizational cooperation: A synthesis of literature." *Constr. Innov.*, 9(3), 285-297.
- Schulz, V. (2000). Nichtmaterielle Anreize als Instrument der Unternehmensführung: Gestaltungsansätze und Wirkungen. DVU, Wiesbaden.
- Shelbourn, M., Bouchlaghem, N.M., Anumba, C., and Carillo, P. (2007). "Planning and implementation of effective collaboration in construction projects." *Constr. Innovation*, 7(4), 357-377.
- Slivon, C.A., Howell, G.A., Koskela, L., and Rooke, J. (2010). "Social Construction: Understanding construction in a human context." *Proc. of the 18th Ann. Meeting of the IGLC*, Haifa, Israel.
- Van Wassenaer, A. (2010). "In search of the perfect project: Incentivising performance and collaboration in construction projects through key performance indicators." *Intern. Constr. Law Rev.*, London, 27(3), 336-362.
- Wild, J. (1973). „Organisation und Hierarchie." *ZFO*, 42(1) 45-54.