Benefits of performance measurement for construction project organizations
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Benefits of Performance Measurement for Construction Project Organizations; A Norwegian Case Study

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Abstract
This paper summarizes the results of a comprehensive case study on the application of the performance measurement tool, CII 10-10, developed by Construction Industry Institute, in three Norwegian construction project organizations. The aim of the paper is to examine the extent to which the benefits of the application of performance measurement in construction project organizations, is realized in practice. Overall, 176 participants among the three organizations responded to a survey which was designed to assess the benefits of application of performance measurement in the case firms. The findings from the survey have had practical value for the three case firms. They all got an assessment of how well they managed to utilize the tool, what value it provided and where they need to put in extra effort to fully realize all the benefits of the tool. Although not all the expected benefits have been realized in the case firms, the process has proved to create value for the firms through boosting the synergy among the teams and raising awareness on the potential improvement areas. The practical implications of this research relate to the benefits of performance measurement as a tool which improves the processes alongside the project product. It emphasizes the potential applicability of performance measurement as a tool for enhancing teamwork, dialogue and communication among project team.

Keywords
Construction projects, Performance measurement, Realized benefits

1 Introduction

In today’s ever-growing competitive market, measuring performance is a critical success factor for businesses (Bassioni, Price and Hassan, 2004). While first developed and rolled out in manufacturing industries, particularly non-financial measures (Gosselin, 2005) and later spread to other sectors characterized by repetitive activities and business processes, e.g., service industries, public sector organizations and sports and culture (Andersen and Fagerhaug, 2002; Currell and Jeukendrup, 2008), performance measurement has also been extensively applied to projects (Love and Holt, 2000; Kagioglou et al., 2001; Neely, 2005; Barclay and Osei-Bryson, 2010).

Many performance measurement frameworks and performance improvement initiatives/methods exist (e.g., Balanced Scorecard, EFQM, just-in-time (JIT), benchmarking, and activity-based management). Each is different in the way it measures performance, yet they can coexist simultaneously. Although these methods are all valid, they measure different aspects of performance (Bassioni et al., 2004). Therefore, there is an ongoing demand in practice and research to develop more comprehensive performance measurement frameworks (Neely, 2005).

Projects are defined as unique undertakings, which in one sense goes against the core feature of continuously refining processes that are repeated over time. Nevertheless, researchers and practitioners have found ways to apply these mechanisms in projects; using measurements to initiate improvements among different projects, as part of the larger programme (Andersen and Fagerhaug, 2002; Thomas and Thomas, 2005).

Projects are ubiquitous in many diverse sectors, with the construction industry being one of the fundamentally project-oriented industries (Parchami and Koosha, 2015; Edum-Fotwe and McCaffer, 2015). It is, however, an industry that for a long time has seen an increasing productivity gap compared with other sectors characterized by higher innovation rates and productivity growth (Brochner and Olofsson, 2012). Performance measurement and benchmarking have slowly been rolled out also in construction projects. Some studies have investigated the feasibility of using these tools in this setting and some have looked into effects of these at the project level, finding some evidence of success (Crawford and Vogl, 2006; Goodrum et al., 2009).
This paper is built around a concerted effort, supported by the Norwegian government, to implement a performance measurement and benchmarking tool in the Norwegian construction industry. This tool which is referred to as CII 10-10, was developed by the Construction Industry Institute (CII) and was adapted and translated to Norwegian. The tool has been utilized in over 25 companies throughout the project value chain. This paper investigates the realized benefits of the application of this tool in Norwegian construction projects, in order to address the following research question:

To what extent does the application of performance measurement tools contribute to realization of the potential benefits of performance measurement in construction project organizations?

Following this introduction, the next section includes the theoretical background for the research. The subsequent sections include the research design and methodology, empirical data and findings, and finally, the discussion and conclusions of the research are presented.

2 Literature Review

Businesses which implement performance measurement are generally recognized as pioneers in their industry and often succeed in changing their organization for the better. In addition, these businesses experience a higher level of consensus among top management, better collaboration among managers of different business sub-sections which their goals are connected to the business’s strategic objectives, information sharing, risk attitude among employees and finally self-evaluation of individuals’ performance (Schiemann and Lingle, 2005).

There is abundance of different performance frameworks which explain what constitutes performance and how it should be measured. Prominent examples include the supportive performance measures matrix (Keegan et al., 1989) the SMART pyramid (Cross and Lynch, 1989), the results/determinants Matrix (Fitzgerald and Moon, 1996) the balanced scorecard (Kaplan and Norton, 1996) project health check (Jaaferi, 2007), The extended enterprise balanced scorecard (Folan and Browne, 2005), PMS-BP (performance measurement system for business processes) (Alfar et al., 2007), earned value management approach as a performance measurement tool for cost control (Bower and Finegan, 2009) and the Swiss cheese performance management model (Almahmoud et al., 2012).

Performance measures, in the capacity of representing a metric used to quantify the efficiency and/or effectiveness of action (Neely, 2005), is very much directed at performance improvement. Performance measurement links strategy to action, motivates employees, supports budgeting and control, allows benchmarking, etc., all of which are geared toward improved performance, at the business level as well as project level (Bourne, 2005). In today’s competitive, complex environment, the performance management approach that focuses only on traditional progress indicators can no longer be sustained and project managers need to manage project’s performance in a proactive rather than reactive manner (Almahmoud et al., 2012).

Although the benefits of performance measurement have been abundantly addressed by different scholars, many businesses fail in implementing a successful performance measurement system (McCunn, 1998; Schiemann and Lingle, 2005). The problem can lie in different levels including metric level (e.g. lack of robust metrics, misuse of deterministic metrics, etc.), framework level (e.g. difficulties incorporating different dimensions, lack of articulated scope, etc.) and management level (lack of managerial commitment, lack of alignment with strategy, etc.) (Van Camp and Braet, 2016). Spitzer (2007) suggests designing the indicators aligned with the business strategy and the stakeholders’ interests, creating a culture of information sharing among the whole organization and openly and continuously discussing the value of performance measurement for the business. This is aligned with the “stakeholder perspective measurement” developed by Love and Holt (2000).

The construction industry, like many other industries is dynamic in nature. The environment within which construction business operate in, has become even more dynamic due to the increase of uncertainties in technology, budgets, and development processes (Chan and Chan, 2004). Performance measurement in the construction industry has traditionally focused on evaluating performance based on achievement of client objectives such as cost, time and quality (Ward et al., 1991; Love and Holt, 2000). Although these three
measures provide an indication for success or failure of projects, they do not provide a balanced view of overall performance of projects. Moreover, the implementation of such measures in construction projects is only obvious at the end of the project, thus acting as “lagging” rather than “leading” indicators.

The use of Performance Measurement Systems (PMS) for benchmarking is also a common practice for continuous improvement in the construction industry. The greatest advantage of the benchmarking process is the focus on the processes rather than only the results and also the involvement of managers in this process (Garvin, 1993). The main purpose of benchmarking is to stimulate continuous learning for both managers and organisations as a whole as an assessment tool (Barber, 2004). In the recent years, PMSs for the construction industry have been established in different countries (Costa et al., 2006). An example of a benchmarking system in the construction industry is the Construction Industry Institute (CII) Benchmarking and Metrics Programme which was initiated in 1993. This programme aimed to provide performance norms to the construction industry, quantify the value and use of best practices, and to help focussing CII research and implementation efforts (Construction Industry Institute, 2012).

This study we will endeavour to identify the level of realization of benefits of the performance measurement tool CII10-10, by the construction firms which implemented it. The main benefits of performance measurement tools and metrics programs, which this study is based on, were identified through an extensive literature review and an earlier research project performed by the author team. The project’s objective was to identify the main benefits of applying performance measurement tools in the Norwegian construction and infrastructure sector. The research participants were over 10 construction and infrastructure firms in Norway (Langlo et al., 2017). These benefits include:

1. Contribution to finding the potential improvement areas
2. Creation of opportunities for learning and dialogue regarding project’s performance
3. Building a foundation for implementation and follow-up on improvement actions
4. Providing feedback on individuals’ performance and creates motivation for improvement
5. Demonstration of the improvement areas within the project portfolio, facilitates follow-up of strategy and supports decision making
6. Creation of the opportunity to compare the performance level at one firm with other firms and build an arena for sharing lessons learnt and experiences

It is worth mentioning that this particular tool was chosen to be applied by the case construction firms due to the diverse performance indicators measured through this tool which is proven to have positive effects on the performance improvement of organizations (Deng and Smyth, 2013). “CII 10-10 is based on the concept of anonymously surveying members of a project’s management team regarding their project’s performance, team dynamics, and organizational relationships” (CII, 2021).

3 Research Methodology

To perform this research, quantitative data was obtained through a survey. A questionnaire was designed to understand the implementation process of CII 10-10 and the results it produced. It was designed based on both literature review and some interviews. A round of interviews was conducted with key people in charge of the use of the CII 10-10 tool in the three case firms. Based on insights from literature and these initial interviews, the survey was designed and carried out among the firms which had applied the tool. Following analysis of the survey data, a new round of interviews with the same participants was carried out, in order for them to reflect on the survey results.

We ran the survey using the software Quest Back. In total, the survey was distributed among 453 respondents and a total of 176 completed responses were collected, representing a response rate of 39%. The survey data was exported from QuestBack and analysed using both Excel and SPSS, and category type data was coded by assigning a numerical value. Two different types of analyses were carried out:
Univariate analysis, to identify responses with highest frequencies as well as variation in the responses. This analysis took both a more explorative form, looking for results that stood out, and a systematic investigation of the issues identified in prior to the survey.

Bivariate analysis, using SPSS, to analyse the correlation (through Pearsons r), differences between respondent groups (using t-test and ANOVA), e.g. systematic differences between project managers and project participants, and applying Levene’s test to determine statistical significance. Least Significant Difference (LSD) was used as post-hoc test.

The two rounds of interviews aided the analysis of the survey data and provided richer insights which could not have been achieved using only the survey results.

4 Findings

4.1 Survey Results

A total of 176 responses were collected across the three firms. Among the respondents, there were a range of full time/ part time employee of the firm and contract-based employees and suppliers. Among those who were full time or part time employees at the firms, 62% were project team members and 38% project managers. Among all the respondents, 98.4% have stated that they have actively participated in answering the CII 10-10 questions. 76.2% have participated in the review of results in meetings with other project team members and only 25.4% have been involved using only the survey results.

Among the respondents, there were a range of full time/ part time employee of the firm and contract-based employees and suppliers. 62% were project team members and 38% project managers. Among all the respondents, 98.4% have stated that they have actively participated in answering the CII 10-10 questions. 76.2% have participated in the review of results in meetings with other project team members and only 25.4% have been involved using only the survey results.

Table 1. Responses to the survey questions

<table>
<thead>
<tr>
<th>Question</th>
<th>% Agree</th>
<th>% Partially Agree</th>
<th>% Neutral</th>
<th>% Partly Disagree</th>
<th>% Disagree</th>
<th>% I don’t know</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Being involved with the use of CII 10-10 was a good opportunity to share my opinion</td>
<td>42</td>
<td>38</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>8</td>
<td>4.24</td>
<td>0.94</td>
</tr>
<tr>
<td>The project manager showed engagement and support during the implementation of CII 10-10</td>
<td>47</td>
<td>24</td>
<td>9</td>
<td>7</td>
<td>3</td>
<td>10</td>
<td>4.17</td>
<td>1.1</td>
</tr>
<tr>
<td>The results obtained from implementation of CII 10-10 increased awareness of the elements which can affect project performance</td>
<td>31</td>
<td>35</td>
<td>13</td>
<td>6</td>
<td>2</td>
<td>13</td>
<td>4.01</td>
<td>0.99</td>
</tr>
<tr>
<td>The results obtained from implementation of the CII 10-10 tool confirmed what the project team already was aware of</td>
<td>29</td>
<td>40</td>
<td>13</td>
<td>4</td>
<td>1</td>
<td>13</td>
<td>4.07</td>
<td>0.88</td>
</tr>
<tr>
<td>The results obtained from implementation of the CII 10-10 tool revealed the strengths and weaknesses in projects</td>
<td>29</td>
<td>38</td>
<td>16</td>
<td>5</td>
<td>0</td>
<td>12</td>
<td>4.04</td>
<td>0.86</td>
</tr>
<tr>
<td>The results obtained from implementation of the CII 10-10 tool provided a good picture of the reality in projects</td>
<td>33</td>
<td>37</td>
<td>7</td>
<td>8</td>
<td>2</td>
<td>12</td>
<td>4.03</td>
<td>1.2</td>
</tr>
<tr>
<td>Being involved with the use of CII 10-10 helped me as a project manager to lead projects in a more effective way</td>
<td>28</td>
<td>42</td>
<td>22</td>
<td>0</td>
<td>3</td>
<td>6</td>
<td>3.97</td>
<td>0.9</td>
</tr>
<tr>
<td>While implementing the CII 10-10 tool, the focus was on creating improvements in the project</td>
<td>37</td>
<td>33</td>
<td>14</td>
<td>7</td>
<td>7</td>
<td>8</td>
<td>3.88</td>
<td>1.2</td>
</tr>
<tr>
<td>Being involved with the use of CII 10-10 led to valuable learning which I can apply in other projects</td>
<td>23</td>
<td>42</td>
<td>18</td>
<td>8</td>
<td>2</td>
<td>7</td>
<td>3.8</td>
<td>0.98</td>
</tr>
<tr>
<td>Being involved with the use of CII 10-10 justified the time I spent on it</td>
<td>36</td>
<td>21</td>
<td>20</td>
<td>10</td>
<td>6</td>
<td>8</td>
<td>3.77</td>
<td>1.25</td>
</tr>
<tr>
<td>Being involved with the use of CII 10-10 helped us prioritize the improvement areas which require focus</td>
<td>19</td>
<td>33</td>
<td>21</td>
<td>9</td>
<td>4</td>
<td>14</td>
<td>3.63</td>
<td>1.08</td>
</tr>
<tr>
<td>Being involved with the use of CII 10-10 motivated me to improve my performance</td>
<td>21</td>
<td>27</td>
<td>26</td>
<td>13</td>
<td>5</td>
<td>11</td>
<td>3.5</td>
<td>1.15</td>
</tr>
<tr>
<td>Being involved with the use of CII 10-10 provided the opportunity for me to affect the project</td>
<td>19</td>
<td>30</td>
<td>23</td>
<td>6</td>
<td>10</td>
<td>11</td>
<td>3.47</td>
<td>1.24</td>
</tr>
<tr>
<td>Being involved with the use of CII 10-10 led to a real opportunity to improve the project</td>
<td>20</td>
<td>31</td>
<td>26</td>
<td>10</td>
<td>8</td>
<td>11</td>
<td>3.47</td>
<td>1.184</td>
</tr>
<tr>
<td>My line manager showed engagement and support during implementation of CII 10-10</td>
<td>29</td>
<td>20</td>
<td>14</td>
<td>20</td>
<td>9</td>
<td>9</td>
<td>3.44</td>
<td>1.39</td>
</tr>
<tr>
<td>Being involved with the use of CII 10-10 increased the project team cooperation</td>
<td>14</td>
<td>19</td>
<td>40</td>
<td>6</td>
<td>6</td>
<td>15</td>
<td>3.36</td>
<td>1.06</td>
</tr>
<tr>
<td>Being involved with the use of CII 10-10 led to development of concrete improvement measures</td>
<td>15</td>
<td>24</td>
<td>17</td>
<td>13</td>
<td>11</td>
<td>19</td>
<td>3.22</td>
<td>1.32</td>
</tr>
<tr>
<td>Being involved with the use of CII 10-10 helped provide me feedback on my performance</td>
<td>17</td>
<td>27</td>
<td>18</td>
<td>20</td>
<td>12</td>
<td>11</td>
<td>3.18</td>
<td>1.31</td>
</tr>
<tr>
<td>The top management showed engagement and support during implementation of CII 10-10</td>
<td>17</td>
<td>11</td>
<td>20</td>
<td>11</td>
<td>14</td>
<td>26</td>
<td>3.08</td>
<td>1.44</td>
</tr>
<tr>
<td>The use of CII 10-10 was done at the time where it was still possible to apply improvements in the project</td>
<td>18</td>
<td>18</td>
<td>13</td>
<td>26</td>
<td>16</td>
<td>8</td>
<td>2.95</td>
<td>1.41</td>
</tr>
<tr>
<td>The use of CII 10-10 led to development of concrete improvement measures which were actually implemented in projects</td>
<td>9</td>
<td>16</td>
<td>17</td>
<td>13</td>
<td>23</td>
<td>22</td>
<td>2.67</td>
<td>1.38</td>
</tr>
</tbody>
</table>

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4.2 Results from correlation analysis and T-test

Having collected the data, we performed a correlation analysis to investigate potential connections between the variables identified through the questionnaire. We have chosen specific correlations which have been identified as most relevant to our problem formulation. Each correlation is presented in a point diagram with associated values for Pearson correlation, the significance value and the number of responses. The correlation is marked with "***" if Sig. (2-tailed) is less than 0.01. i.e. it is 99% certain that this will also apply to the total population. Note that the number of answers is lower due to excluding the “I don’t know” responses (See Table 2).

Table 2. Correlation analysis results

<table>
<thead>
<tr>
<th>Variable 1</th>
<th>Variable 2</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Being involved with the use of CII 10-10 was a good opportunity to share my opinion</td>
<td>Being involved with the use of CII 10-10 increased the project team collaboration</td>
<td>0.449</td>
<td>0.000</td>
<td>87</td>
</tr>
<tr>
<td>The results obtained from implementation of the CII 10-10 tool provided a good picture of the reality in projects</td>
<td>Being involved with the use of CII 10-10 motivated me to improve my performance</td>
<td>0.542</td>
<td>0.000</td>
<td>90</td>
</tr>
<tr>
<td>The results obtained from implementation of the CII 10-10 tool revealed the strengths and weaknesses in projects</td>
<td>Being involved with the use of CII 10-10 helped us prioritize the improvement areas which require focus</td>
<td>0.615</td>
<td>0.000</td>
<td>81</td>
</tr>
<tr>
<td>The use of CII 10-10 was done at the time where it was still possible to apply improvements in the project</td>
<td>Being involved with the use of CII 10-10 led to a real opportunity to improve the project</td>
<td>0.369</td>
<td>0.000</td>
<td>93</td>
</tr>
<tr>
<td>The use of CII 10-10 was done at the time where it was still possible to apply improvements in the project</td>
<td>While implementing the CII 10-10 tool, the focus was on creating improvements in the project</td>
<td>0.425</td>
<td>0.000</td>
<td>95</td>
</tr>
<tr>
<td>Being involved with the use of CII 10-10 motivated me to improve my performance</td>
<td>Being involved with the use of CII 10-10 helped provide me feedback on my performance</td>
<td>0.747</td>
<td>0.000</td>
<td>90</td>
</tr>
</tbody>
</table>

We gathered data from respondents who were either project managers or project members. They were also categorized based on whether they were internal or external to the firm and their employment status being permanent or temporary. In order to compare the responses from these different groups of respondents, we performed a Bivariate analysis in form of a T-test for all questions. The most relevant finding related to the issue under study are presented in table 4.

Table 4. T-test results for project managers and project members

<table>
<thead>
<tr>
<th>Role</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Being involved with the use of CII 10-10 motivated me to improve my performance</td>
<td>Project member</td>
<td>47</td>
<td>2.72</td>
<td>1.14</td>
<td>-4.183</td>
<td>79</td>
</tr>
<tr>
<td>Being involved with the use of CII 10-10 helped provide me feedback on my performance</td>
<td>Project manager</td>
<td>34</td>
<td>3.58</td>
<td>1.28</td>
<td>-2.874</td>
<td>33</td>
</tr>
<tr>
<td>Being involved with the use of CII 10-10 motivated me to improve my performance</td>
<td>Project member</td>
<td>47</td>
<td>3.11</td>
<td>1.07</td>
<td>-3.768</td>
<td>77</td>
</tr>
<tr>
<td>Being involved with the use of CII 10-10 helped provide me feedback on my performance</td>
<td>Project manager</td>
<td>34</td>
<td>4.09</td>
<td>0.98</td>
<td>-3.797</td>
<td>33</td>
</tr>
</tbody>
</table>

5 Discussion

In the outset of this research, we identified 6 major benefits of performance measurement for project organizations. These benefits are drawn from an earlier project which focused on identifying the main benefits of performance measurement in the Norwegian construction sector (Langlo et al., 2017). The extent to which these benefits can be realized in practice, are discussed in this section.

5.1 Performance measurement contributes to identifying the potential improvement areas

The case firms have been successful in realizing this benefit. The claim that the results from the CII 10-10 survey highlighted strengths and weaknesses in the project achieved a score of 4.04 (s = 0.86). In addition, when asked whether the result from the CII 10-10 survey gave a good picture of the reality of projects, the obtained score was an average of 4.03 (s = 1.02). Another high score, 4.01 (s = 0.99), was on the question on
whether the results from the CII 10-10 survey increased awareness on what elements affect performance in projects. This may indicate that the process of answering the CII 10-10 questionnaire and having the results presented among teams, can change the focus of the participants towards how they can influence the project's performance as individuals. The claim that performance measurement systems are effective in changing attitudes and actions (Andersen & Henriksen, 2004; de Waal & Kourtit, 2013) manifests itself in reality. Although the findings show that the results obtained from implementation of the CII 10-10 tool confirmed what the project team already was aware of 4.07 (s = 0.88 ), the strong positive correlation of r = 0.543 between the statements that “the use of CII 10-10 highlighted strengths and weaknesses in the project” and “the work with CII 10-10 helped us prioritize which improvement areas need focus” can reveal that even if strengths and weaknesses are known in advance, CII 10-10 has a confirmatory value and is the trigger that is needed to prioritize areas for improvement.

5.2 Performance measurement creates opportunities for learning and dialogue regarding project’s performance

79% of the respondents have participated in reflection meetings to review the results from the CII 10-10 survey. The interview results confirmed that these meetings created an arena for discussions which would have not happened otherwise. The findings are further confirmed by the respondents’ score of 4.24 (s = 0.94) to the statement that being involved with the use of CII 10-10 was a good opportunity to share my opinion. Although project managers seem to agree more with this statement, with a score of 4.50 (s = 0.78), comparing to project participants, with a score of 4.00 (s = 1.00). This makes sense as CII 10-10 seems to have a stronger focus on management and specifically the project manager’s scope of work. Inclusion of all stakeholders in dialogue is a major benefit of using a performance measurement system. It is particularly beneficial for projects where many different organizations are involved (Langlo et al., 2017; Spitzer, 2007). Firms A and C have both chosen to include external parties, such as customers and contractors. In the survey, the external actors’ score higher on the statement “being involved with the use of CII 10-10 was a good opportunity to share my opinion” comparing to the internal actors. This indicates that by including the external parties in the work with CII 10-10, an arena is created where those who are usually not involved in the project discussions, get the chance to express their opinions. The respondents’ score of 4.01 (s = 0.99) when asked whether the results obtained from implementation of CII 10-10 increased awareness of the elements which can affect project performance, confirms this element.

5.3 Performance measurement builds a foundation for implementation and follow-up on improvement actions

The level of realization of this benefit was lower comparing to the above mentioned benefits. Although all the firms manage to create improvement measures, not all can fully implement them. The respondents scored 3.22 (s = 1.32) to the question on whether the work with CII 10-10 resulted in concrete improvement measures. Although the answers are quite scattered, it may seem that they do to some extent succeed in identifying measures in the projects. The actual implementation of these measures however seem to be more challenging. On average, only 27% of the respondents have been involved in implementing improvement measures as a result of CII 10-10. When asked if the work resulted in improvement measures that were actually implemented in the project, the respondents scored an average of 2.67 (s = 1.38). They tend to disagree with this statement, which indicates that they do not utilize the full potential of performance measurement. One of the several factors that appear to influence the implementation of improvement measures is the timing of the measurement. The statement that the work with CII 10-10 was carried out at a time when it was still possible to make changes to the project and the statement that it resulted in improvement measures that were actually implemented in the project, correlate positively with each other with a correlation factor of r = 0.615. In addition, the low score for “The use of CII 10-10 was done at the time where it was still possible to apply improvements in the project” may indicate that this is an obstacle to realizing the benefits.
5.4 Performance measurement provides feedback on individuals’ performance and creates motivation for improvement

Project managers mainly receive feedback on their own performance and are motivated by the work with CII 10-10 in all the firms. This, however, does not apply to project participants, who on the contrary do not feel they receive the same feedback or are equally motivated. This is perhaps one of the few occasions where project managers receive feedback on their own achievements as a leader and is something they greatly appreciate. Being a leader is lonely, you have no colleagues at the same level and it can be difficult to find someone who is confident enough to give you honest feedback (Ekman, 2004). The CII 10-10 survey has a separate category for management which specifically provides feedback to the project managers. For the project participants, there is no "separate" category. The questions that concern them are at group level and do not provide any direct individual feedback. Previously, we have seen that firms succeed in creating an arena for discussion. Here, it is conceivable that there is a potential for the project participants to receive individual feedback, however not all firms succeed in effectively running this process.

When it comes motivation to improve own performance, there is a significant difference between project managers and project participants. Although project managers (M = 4.00, s = 0.98) are motivated, project participants (M = 3.11, s = 1.07) do not experience the same. A possible explanation is found in a strong positive correlation with r = 0.747 between this statement and the statement from the previous section that the work with CII 10-10 facilitated feedback on own performance. It seems natural that the participants are not motivated as they do not receive feedback on their own performance to the same extent as project managers. Another possible explanation is that participants do not see the possible improvements that are implemented to the same extent as the project managers do. This was confirmed by the fact that only 23% have received information about implemented improvement measures.

5.5 Performance measurement of the improvement areas within the project portfolio, facilitates follow-up of strategy and supports decision making

Firms A and C have had little success in realizing this benefit. On the other hand, Firm B, succeeds in creating insight into its own portfolio and utilizing the data to implement specific improvement measures. In order to ensure insight into one's own portfolio and find potential for improvement, statistical analysis of the data base should be performed, often called portfolio analysis (Langlo et al., 2017). When we asked the project managers if top management showed commitment during the work with CII 10-10, they scored an average of 3.44 (s = 1.39) and 3.08 (s = 1.44), respectively. The coordinators in firms A and B support the project managers and call for greater commitment from top management. They believe that CII 10-10 is anchored in the management through management documents and work processes, but that the management shows little interest and follows up the work to a small degree. The literature points to anchoring in management as a clear driver / barrier to success with performance measurement systems, which should be a concern for businesses (Spitzer, 2007; Nudurupati et al., 2011). It is interesting to see that in firm C, the project managers state that both the line manager and top management show commitment, with average scores of 4.50 and 4.33, which is clearly different from the other two firms. It becomes a paradox that firm C is still not able to carry out portfolio analysis despite great commitment from top management. It may seem that other factors come into play.

A possible answer can be found in the interviews with the managers in firms A and C and the coordinators in firms A and B. They say that the firms 'many ongoing change measures "compete" for the managers' time and resources, which leads to little interest in utilizing the data from 10 -10.

5.6 Performance measurement creates the opportunity to compare the performance level at one firm with other firms and build an arena for sharing lessons learnt and experiences

The firms do not fully succeed in benchmarking their own performance against others. The CII 10-10-tool automatically compares a project's performance with similar recorded projects in ten general factors, thus prompting sharing of results. However, this requires a high number of firms to have taken part in implementing this tool, in order for a proper data base to be created. Clearly the more the users who apply this
tool, more accurate benchmarking result can be obtained for each firm. In addition, the businesses seem to have been rather unsuccessful in creating an arena for sharing and learning from each other’s experiences, despite being geographically close and all being state owned firms. This issue was mentioned by all interviewed leaders and one stated “most of the gains still lie ahead of us.” The firms that share best practices and compare performance with others are the ones that succeed the most with performance measurement. There is a user forum for all users of the CII 10-10 tool which all three firms believe they can greatly benefit from. The benefits come from sharing experiences from the use of CII 10-10, including the process of application of the tool, how to hold reflection meetings, how to perform analysis and use the results. This however seems to be a benefit which can be realized over a longer period of time for the firms.

6 Conclusions and Further Research

This study shows that the findings from the survey have had practical value for the three case firms. They all got an overview of how well they managed to utilize the tool, what value it provided and where they need to put in extra effort to fully realize all the benefits.

Although the study reveals that not all the expected benefits have been realized in the case firms, the process has proved to create value for the firms through creating better synergy among the teams and raising awareness on the potential improvements which would not have been realized otherwise.

The immediate implications of this study target the Norwegian construction sector, however, the main practical implications of our study relate to the benefits of performance measurement as a tool which improves the processes alongside the project product, in any construction context. This study also emphasizes the potential of performance measurement as a tool for enhancing teamwork, dialogue and communication among project team. It is important for project managers and businesses to realize the significance of keeping the team a priority, bringing the team together and measuring themselves against the project goals. Moreover, the different users of performance measurement tools can act as a community of practice where best practice can be shared, leading to improvements for the participants in different areas. It is of course worth mentioning that the more diverse indicators are measured through performance measurement tools, the higher would be the realization of its potential benefits at both project and firm level.

Potential requirements for bridging the knowing–doing gap through performance measurement represent an important topic for further study in the construction sector in different contexts.

7 References


Spitzer, D. R., 2007 Transforming Performance Measurement: Rethinking the Way We Measure and Drive Organizational Success, New York, NY: AMACOM.