HAL open science

LOCATING PERFORMANCE MEASUREMENTS IN CONSTRUCTION SECTOR COMPANIES: TO WHERE SHOULD WE GO?

Guilherme Alcantara Pinto, Joseph Mansour Salamé, Isabelle Nicolaï

To cite this version:

Guilherme Alcantara Pinto, Joseph Mansour Salamé, Isabelle Nicolaï. LOCATING PERFORMANCE MEASUREMENTS IN CONSTRUCTION SECTOR COMPANIES: TO WHERE SHOULD WE GO?. XXVIII SIMPEP, Nov 2021, Bauru, Brazil. hal-03336944

HAL Id: hal-03336944

https://centralesupelec.hal.science/hal-03336944v1

Submitted on 7 Sep 2021

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

XXVIII SIMPEP
Simpósio de Engenharia de Produção
"ENSINO EM ENGENHARIA DE PRODUÇÃO: COMO PREPARAR AS NOVAS GERAÇÕES PARA OS DESAFIOS DO SÉCULO XXI"
10, 11 E 12 DE NOVEMBRO DE 2021

LOCATING PERFORMANCE MEASUREMENTS IN CONSTRUCTION SECTOR COMPANIES: TO WHERE SHOULD WE GO?

GUILHERME ALCÂNTARA PINTO – g.taminha@gmail.com
Université Paris-Saclay – Ecole CentraleSupeléc

JOSEPH MANSOUR SALAMÉ – joseph.mansoursalame@centralesupelec.fr
Université Paris-Saclay – Ecole CentraleSupeléc

ISABELLE NICOLAÏ – isabelle.nicolai@centralesupelec.fr
Université Paris-Saclay – Ecole CentraleSupeléc

Área: *6. ENGENHARIA ORGANIZACIONAL*
Sub-Área: *6.3 – GESTÃO DO DESEMPENHO ORGANIZACIONAL*

Abstract: *The construction industry is claimed to be the most lethal economic sector. Despite efforts to include safety as a relevant indicator, managers are still trying to figure out which organizational buttons they need to push to unleash safety performance. To investigate this problem, we draw from performance measurement lens to develop a systematic literature review aided by VOSviewer and to localize safety performance measurement papers within organizational levels. We have found that safety studies are localized in the individual and micro-organizational levels, lacking a connection with macro-organizational level, and firm's organizational performance. We then underpin further investigation on this subject to allow better integration of safety into company's management system and adjacent performance measurements. By doing so we aim to push future studies on this field to conceive safety as a source of organizational performance.*

Keywords: *PERFORMANCE MEASUREMENT; SAFETY PERFORMANCE MEASUREMENT; SYSTEMATIC REVIEW; CONSTRUCTION INDUSTRY*

LOCALIZANDO A MEDIÇÃO DE PERFORMANCE EM EMPRESAS DO SETOR DA CONSTRUÇÃO CIVIL: PARA ONDE DEVEMOS IR?

Resumo: *A indústria da construção é conhecida como o setor econômico mais letal. Apesar dos esforços em incluir segurança como um indicador relevante, gerentes ainda buscam descobrir quais botões organizacionais devem apertar para desencadear a performance da segurança. Para investigar esse problema, partimos da literatura de medição de performance para desenvolver uma revisão sistemática auxiliada pelo VOSviewer e localizar artigos de medição de performance em segurança dentro dos níveis organizacionais. Nós encontramos que os estudos se encontram nos níveis individuais e micro-organizacionais, demonstrando uma falta de conexão com os níveis macro-organizacionais e a performance organizacional da firma. Nós então propomos futuras investigações sobre o assunto de maneira a melhorar a integração da segurança no sistema de gestão da empresa e medições de performance adjacentes. Dessa forma buscamos direcionar estudos futuros para conceber a segurança como fonte de performance organizacional.*

Palavras-chaves: *MEDIÇÃO DE PERFORMANCE; MEDIÇÃO DE PERFORMANCE DE SEGURANÇA OCUPACIONAL; REVISÃO SISTEMÁTICA; INDÚSTRIA DE CONSTRUÇÃO*

1. INTRODUCTION

Construction industry is claimed to be the most lethal economic sector (Injury Facts, 2021; OSHA, 2020). Despite researchers' efforts to include safety as a relevant indicator in project management performance (Ali et al., 2013; Sibiya et al., 2015), and in firm performance (Latiffi et al., 2009), managers are still trying to figure out which organizational buttons they need to push unleash safety performance.

In fact, safety is definitively not the most important variable in the construction industry. Across 45 years of literature development in project management research, cost and schedule are still the most discussed terms in this sector (Pollack et al., 2018). On the other hand, all the indicators employed in an organization to measure any variable shapes organizational behavior and beliefs, according to performance measurement literature (Neely et al., 1997; Pavlov & Bourne, 2011).

Forty-five years discussing costs and schedule, may have impacted; indeed, they created an organizational myth (Sousa et al., 2021): Investments in occupational safety negatively impacts financial performance. Fortunately, researchers have been "busting" this myth across many industries (Sousa et al., 2021): manufacturing industry (D. K. Kim & Park, 2021), across different sectors (Argilés-Bosch et al., 2014), and even in the construction sector (Forteza et al., 2017). In fact, this is not any novelty; researchers have been busting this myth since 1997 (Kjellén et al., 1997)!

We then question: why is it still so difficult to improve safety performance? What does it take to break practitioners' belief? To investigate this problem, this study seeks to localize safety performance measurement papers within organizational levels to present possibilities of further investigation that would allow better integration of safety into company's management system and adjacent performance measurements. By doing so, we aim to push future studies on this field to conceive safety as a source of performance.

In the next section we present the theoretical lens we will be using to address this subject, and key concepts of performance measurement. After, we describe the steps used to develop this research, and our findings. Finally, we draw some considerations along with the limitations and further investigations suggested.

2. THE PERFORMANCE MEASUREMENT COMPLEXITY

The subject of performance measurement is of such complexity that current literature

relies on six different theories: agency theory, contingency theory, goal-setting theory, equity theory, resource-based view of the firm, and cognitive-based psychology research (Franco-Santos et al., 2012). Even though construction sector papers draw recommendations for designing performance measurement metrics (Robinson et al., 2005; Yang et al., 2010), one of the main barriers on adopting performance measurement systems in this industry is the necessary knowledge on this practice (Sabone & Addo-Tenkorang, 2016). This section seeks to underpin studies on performance measurement that support the connection between safety and company performance.

One of the key references on measuring organizational performance is (Richard et al., 2009) which has proposed a methodological best practice guide to aid researchers chose which parameters could be used to assess companies' performance. Their major contribution to this study allows us to see the performance dimensions individually, yet integrated. Two elements are suggested by them for measuring performance: organizational performance, and organizational effectiveness

The organizational performance is described in three dimensions according to (Richard et al., 2009): (a) financial performance: profit, return on assets, return on investment, etc.; (b) product market performance (sales, market share, etc.); (c) shareholder return (total shareholder return, economic value added, etc.). Even though other approaches may consider (b) as operational performance (Venkatraman & Ramanujam, 1986), this is not our intention in this study; the definition we adopt as operational performance regards the operation effectiveness, as we explain on the next paragraph.

The organizational effectiveness regards performance outcomes "associated with more efficient or effective operations and other external measures that relate to considerations that are broader than those simply associated with economic valuation (either by shareholders, managers, or customers), such as Corporate Social Responsibility" (Richard et al., 2009, p. 722).

While analyzing and handling performance measurements two key characteristics must be considered to both performances: (i) the multidimensionality and the measures researchers might adopt on this process (Richard et al., 2009; Venkatraman & Ramanujam, 1986); (ii) the "closely tailored" measures of organizational effectiveness for each individual firm and hence the highly dependence on organizational context (Richard et al., 2009). Within the scope of this paper, we rely on both elements to draw the main discussions around our problematic. We detail them on the following paragraphs.

The first source of multidimensionality regards the fact that stakeholders have

different motivations inside of a company, which may demand for different measurement needs (Venkatraman & Ramanujam, 1986). Another source is the time series impact on organizational performance; a company may (Richard et al., 2009; Venkatraman & Ramanujam, 1986). A company may sustain relative performance over time due to industry sector effects.

The impact of safety is very clear before a trade-off between safety and performance. "with economic resources becoming more and more scarce, companies were less and less willing to make 'nonproductive' expenditures" (Hofmann et al., 1995, p. 138). Yet, safety investments are even more important during production pressure or when least affordable (Dekker et al., 2008).

Another aspect is that measures adopted might also be highly time-dependent: the accidents impact in company's performance is claimed to be seen one year ahead the financial performance (Argilés-Bosch et al., 2014). Reputation effect for instance, could create feedbacks on the same performance dimension (Richard et al., 2009).

Moving on to the organizational effectiveness, according to Neely et al. (1997) a well-designed performance measure also comprises the organizational context in the sense that by attaining to the management system, those measures shapes workers behavior and beliefs (Franco-Santos et al., 2007; Neely et al., 1997; Pavlov & Bourne, 2011).

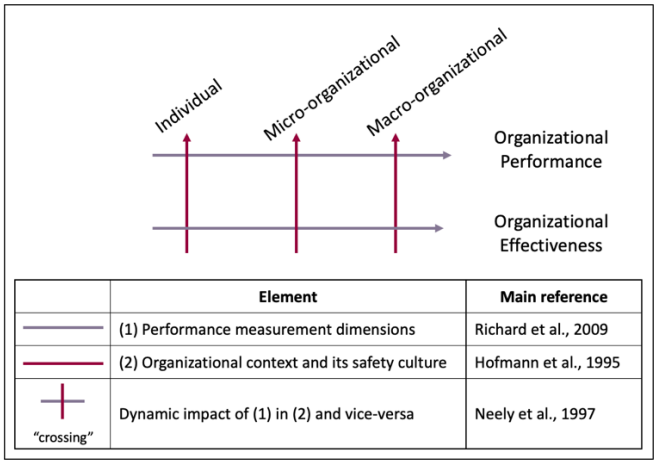
Thus, due to its "closely-tailored" nature, the wrong measures provoke wrong workforce reaction; in other words: the performance measurement (indicators) impact over performance itself – which is another source of multidimensionality (Richard et al., 2009). According to them, each company has their own set of indicators and management practices, following their strategic objectives and trajectory across time – it is highly dependent on the organizational context.

Those aspects, leads us to the culture and safety behavior (more specifically), which its importance have been highlighted in the literature review of (Collins & Gadd, 2002). We rely on (Hofmann et al., 1995; Guldenmund, 2007) who have studied how three organizational levels influence on safety: individual, micro-organizational, and macro-organizational level. We will approach our subject in a similar attempt.

The individual level lies on the comprehension of worker's attitude, behavior and knowledge given the context and culture s/he is immersed. The micro-organizational level regards organizational self-regulation policies, management practices and attitudes towards safety, work design that create unsafe conditions, and accountability of accidents. The macro-organizational level comprises a broader view of company's production process, higher

organizational levels (Guldenmund, 2007), the technology employed and required knowledge, vertical and horizontal communication, and the decision-making descentralization/centralization within the organization (Hofmann et al., 1995). The elements discussed on this section is summarized on Figure 1.

Figure 1 – The dynamic impact of performance dimensions on organizational structure and its safety culture (and vice-versa)



Source: Prepared by the authors

3. METHODOLOGY

We want to locate performance measurement papers into our Figure 1. After, we need to highlight safety studies into this framework and then analyze to where our efforts on safety performance measurements should be directed. This objective is congruent to a systematic review of literature method (Denyer & Tranfield, 2009).

The articles were searched on Scopus and Web of Science database with two terms. The former is "construction industry" and its synonyms, followed by the union operator and the latter: "performance measurement". Even though our theme regards *safety* performance measurement, we decided to not include safety in our search string because we want to assess possible interfaces that safety literature could explore towards a closer integration to company's management system. Table 1 shows the query results.

TABLE 1 – Number of papers analyzed*

Scientific DataBase	Number of papers found (total)	Duplicated (-)	Retained on abstract screening (-)	Final sample
Scopus	353	149	50	378
WoS	224			
TOTAL	577			

Source: prepared by the authors
* The review data was collected on June 3rd, 2021. The synonyms employed on the search strings (shown below) were validated by specialists during research group meetings.

The duplicates removal took place in Zotero reference manager and Microsoft Excel sheet (double-checked). Articles were single screened on their abstracts only, considering conceptual, review, empirical, and viewpoints articles, published in journals and conferences, following the inclusion criteria:

- Research developed within the building industry, its companies, or implications on adjacent players such as subcontractors, suppliers, and clients.
- Research concerns performance measurement and management practices.
- Research does not analyze performance of technical aspects such as cement, concrete, chemical compounds, neither environmental issue nor objects neither software.

We employed VOSviewer software (van Eck & Waltman, 2010) to produce a bibliographical map of the field study. This is suited to this research because it shows the relatedness of the concepts investigated and their respective clusters (Van Eck & Waltman, 2013). The map was prepared according to the keywords employed by the database (author keywords in WoS and indexed keywords in Scopus). The aim was to guide our in-depth reading across the clusters. We also employed snowball technique when necessary.

4. LOCATING SAFETY PERFORMANCE MEASUREMENTS OF CONSTRUCTION SECTOR COMPANIES: POSSIBLE INTERFACES

In this Figure 2 we show a VOSviewer map; each circle represents a keyword; its size is larger according to the weight of the term. In this network the weight is given by the co-occurrence of this keyword; The line going out of the circles represents the links among the concepts, which also vary its intensity: the stronger, the more papers have explored this connection. The spatial distance between the terms represents their relatedness and the color represents the cluster from which that term belongs (Van Eck & Waltman, 2013).

We produced this map using 286 keywords considering a minimum number of three occurrences. We found six clusters. First, the red cluster contained terms such as performance measurement, BSC, and KPI, we labeled as “most frequent terms” since those are the most used approaches in construction (Yang et al., 2010). The cyan cluster, “supply chain”, has elements such as supply chain management, green supply chain management, and logistics.

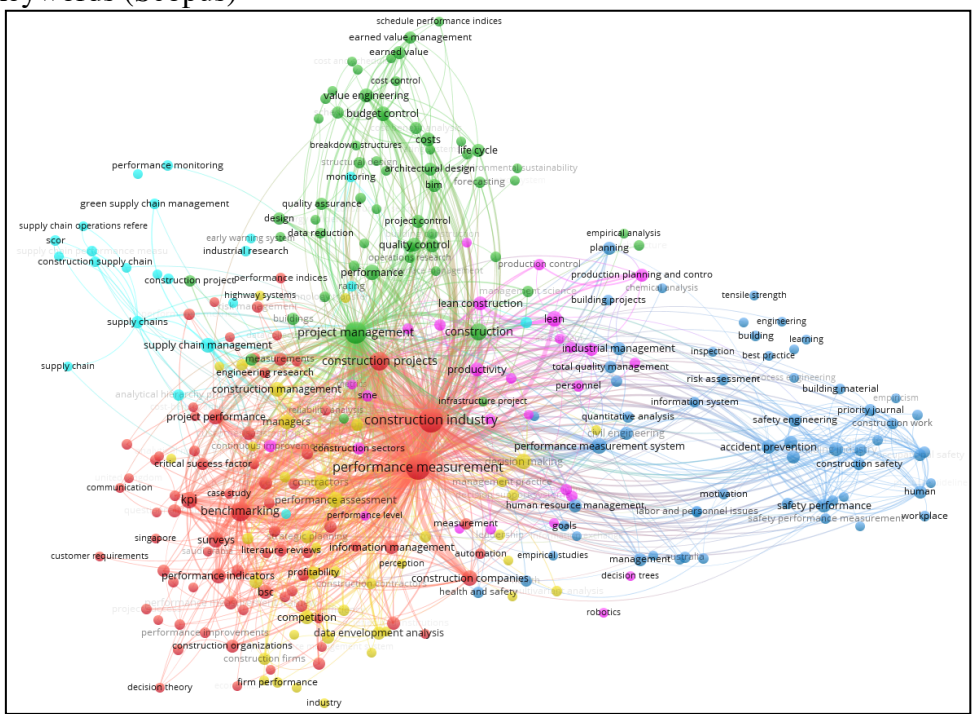
The green cluster is majorly formed by project management related terms such as budget, quality and project control and indicators. In the blue cluster we locate safety-related

terms: accident, prevention, safety performance. We note the blue cluster spatially distant to the others on the far right. It shows a lack of relatedness with other categories regarding performance measurement.

We also note, however, that the safety cluster is connected to red and green cluster by clusters pink and yellow – they seem to be of key importance to improve safety research due to its conceptual interface. The former we call "process management" and they present elements such as lean (production and construction), production planning and control, and quality management. Bridging with blue cluster, researchers have proposed models to integrate construction production areas to safety. For instance, Safety Planning and Control – SPC Model (Saurin et al., 2004), the integration of lean concepts into the SPC Model (Saurin et al., 2008), the investigation of Last Planner System and its impact on safety when employed with EVM (Earned-value Management) (S.-C. Kim et al., 2015).

The latter, yellow cluster, we call "strategic/financial" due to its higher density on the bottom left of the network. Terms range from competition, competitive advantage, profitability, firm performance to stakeholders. Despite its conceptual interface with safety, studies have only employed analytical methods, rather than management approaches. In our sample, (Latiffi et al., 2009) found out that that safety is an element of strategic non-financial performance using semi-structured interviews.

Figure 2 – Keyword network from VOSviewer; data from authors' keywords (WoS) and indexed keywords (Scopus)

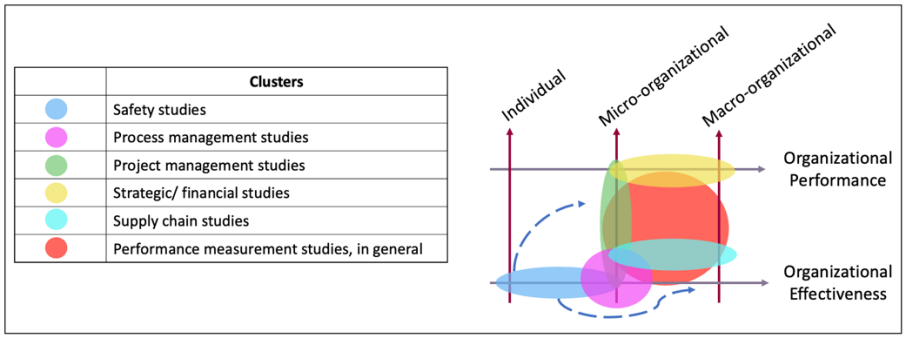


Source: Prepared by the authors using VOSviewer software (van Eck & Waltman, 2010)

4.1 To where should we go?

To answer our research question, in Figure 3 we place the clusters in our theoretical background framework prepared in section 2. We draw our discussion focusing on safety studies on the following paragraphs.

Figure 3 – Performance Measurement research



Source: prepared by the authors

We observe a predominance of safety performance measurement studies on the organizational effectiveness positioning safety on the individual level (workers' attitudes and behavior) and especially on micro-organizational level (organizational self-regulation policies, management practices, studies of work-design that create and avoid unsafe conditions) (Hofmann et al., 1995). The studies on the individual level are not numerous if compared to the total (performance measurement), and they have tried to propose indicators comprehending worker's cognition and behavior (Cameron & Duff, 2007), often relying on behavioral-based safety suits the individual dimension (Choudhry, 2014).

Corresponding to (Neely et al., 1997) statement that performance measurements shape organizational behavior and beliefs, to the best of our knowledge, no studies have investigated the impact of performance measurements into safety behavior. A possible hypothesis could be: "have workers rushed on their task because they felt behind the schedule and hence exposed themselves to unsafe conditions?" This is an example of the impact of a performance measure (red cluster) into safety performance measures (blue cluster), using the culture and beliefs lens.

On the other hand, the studies on micro-organizational level are the majority in Safety Performance Measurement (SPM) (blue). The studies strive to develop the research on SPM Systems, and often rely on the discussion of leading and lagging indicators (Xu et al., 2021). Even though recent studies have used Resilience Engineering approach (Penaloza et al., 2020), they still present a punctual assessment of safety systems rather than a continuous

measurement that could be of a more recurrent use by practitioners allowing more fluid integration in company's management system – this is the case of the Resilience Analysis Grid (RAG) (Hollnagel, 2017b), in our opinion.

In the macro-organizational level, however, very few studies have considered safety performance measurement on higher organizational levels. To the best of our knowledge, the only tool mentioned, and yet adapted, to this aim was the BSC (Dulaimi & Chin, 2009). However, in an environment of too many stakeholders, BSC is not useful (Yang et al., 2010), and we add this to the fact that safety has extra-financial values (Latiffi et al., 2009) which could present different value flows inside the organization.

Furthermore, safety have not been proposed as a source of performance, in a more strategic sense. To do so, we see two possible paths (dashed arrows in Figure 3): safety as a source of organizational performance, or as a source of organizational effectiveness.

For the former, studies have explored the impact of safety performance measurements on organizational performance using analytical tools only (Forteza et al., 2017). Despite this study importance, it does not translate in a method "how to improve this performance". The organizational levels seem to be too far (site level, and strategic level) increasing the difficulty to communicate those levels. Research should trace safety value considering different organizational levels.

Since cost/schedule are the most important variables to this industry (Ali et al., 2013; Sibiya et al., 2015), we understand that a possible path to integrate those levels is finding a connection between safety performance measurements and cost/schedule practices. The process management techniques (pink cluster) might have insights on this matter – which leads us to safety as a source of organizational effectiveness.

For the latter, further investigation should be done on RE concept (Hollnagel, 2017a), which is as a paradigmatic concept in safety management literature (Righi et al., 2015). There is still space to propose management strategies, tools and indicators basing on Resilience Engineering (Sapeciay et al., 2019) but we see of particular importance to bridge those methods to the macro-organizational level in a sense that safety become seen as source of performance, instead of a conflicting goal inside the organization as it is proposed. Other possible paths rely on the lean practices employed, such as Lean Construction, Last Planner System and SPC Model (Y.-W. Kim & Ballard, 2010; Saurin et al., 2004).

Plus, we highlight that no studies in our sample (i) have proposed safety performance measurements considering ISO 45001:2018; (ii) have proposed subjective performance measures, which has their importance because they are able to translate the context dimension

(Richard et al., 2009); (iii) explored safety as a source of extra-financial performance.

5. FINAL CONSIDERATIONS

In this article we have localized safety performance measurement research in the organizational context. By doing so, we have proposed possible further research investigations exploring the interface with other performance measurement tools, towards a better integration of safety into company's management system. Our theoretical lens were the organizational performance and effectiveness to address the performance dimensions a company has, and the impact of the measurements employed on the organizational levels.

The studies on the individual level are not numerous and often rely on behavioral-based safety proposing indicators considering workers' cognition and behavior. None of them have explored the impact of performance measurements into safety behavior, though. Those on micro-organizational level are the majority and develop project and process management practices, including leading and lagging indicators, and measurements for new technologies.

Unfortunately, very few studies have proposed methods, or theoretically analyzed safety through the macro-organizational and organizational performance lens – in a strategic sense. This is the main research gap we have found and draw attention of researchers. Filling this gap is of keen importance because even though the organizational myth has already been busted, practitioners still facing difficulties on seeing safety as a source of performance due to their beliefs. We have proposed possible investigations on this subject, calling for studies to investigate how safety value could flow from the individual and micro-organizational level to macro-organizational level, enhancing company's performance.

More than tackling these research gaps, further studies could address our study limitations: (i) we employed a systematic review using VOSviewer – other software and techniques could provide different insights; (ii) the string employed, could consider more synonyms, especially from the performance measurement field; and (iii) we considered only articles in Web of Science and Scopus databases, though applied snow-ball techniques.

6. REFERENCES

Ali, H. A. E. M., Al-Sulaihi, I. A., & Al-Gahtani, K. S. (2013). Indicators for measuring performance of building construction companies in Kingdom of Saudi Arabia. Journal of King Saud University - Engineering Sciences, 25(2), 125–134.

Argilés-Bosch, J. M., Martí, J., Monllau, T., Garcia-Blandón, J., & Urgell, T. (2014). Empirical analysis of the incidence of accidents in the workplace on firms' financial performance. Safety Science, 70, 123–132.

Atkinson, R. (1999). Project management: Cost, time and quality, two best guesses and a phenomenon, its time to accept other success criteria. International Journal of Project Management, 17(6), 337–342.

Bhagwat, K., & Delhi, V. S. K. (2021). Review of construction safety performance measurement methods and practices: A science mapping approach. International Journal of Construction Management, 0(0), 1–15.

Cameron, I., & Duff, R. (2007). Use of performance measurement and goal setting to improve construction managers' focus on health and safety. Construction Management and Economics, 25(8), 869–881.

Choudhry, R. M. (2014). Behavior-based safety on construction sites: A case study. Accident Analysis and Prevention, 70, 14–23.

Collins, A. M., & Gadd, S. (2002). Safety Culture: A review of the literature. https://www.hse.gov.uk/research/hsl_pdf/2002/hsl02-25.pdf

Dekker, S., Hollnagel, E., Woods, D., & Cook, R. (2008). Resilience Engineering: New directions for measuring and maintaining safety in complex systems (p. 67). Lund University School of Aviation.

Denyer, D., & Tranfield, D. (2009). Producing a Systematic Review. In D. A. Buchanan & A. Bryman, The Sage handbook of Organizational Research Methods (pp. 671–689). Sage Publications Inc.

Dulaimi, M., & Chin, K. Y. K. (2009). Management perspective of the balanced scorecard to measure safety culture in construction projects in Singapore. International Journal of Construction Management, 9(1), 13–25.

Forteza, F. J., Carretero-Gómez, J. M., & Sesé, A. (2017). Occupational risks, accidents on sites and economic performance of construction firms. Safety Science, 94, 61–76.

Franco-Santos, M., Lucianetti, L., & Bourne, M. (2012). Contemporary performance measurement systems: A review of their consequences and a framework for research. Management Accounting Research, 23(2), 79–119.

Guldenmund, F. W. (2007). The use of questionnaires in safety culture research – an evaluation. Safety Science, 45(6), 723–743.

Hofmann, D. A., Jacobs, R., & Landy, F. (1995). High reliability process industries: Individual, micro, and macro organizational influences on safety performance. Journal of Safety Research, 26(3), 131–149.

Hollnagel, E. (Ed.). (2017a). Prologue: The Scope of Resilience Engineering by Erik Hollnagel. In Resilience Engineering in Practice: A Guidebook (1st ed., p. xxix). CRC Press.

Hollnagel, E. (Ed.). (2017b). Epilogue: RAG - The Resilience Analysis Grid. In Resilience Engineering in Practice: A Guidebook (1st ed., p. 275). CRC Press.

Injury Facts. (2021). Most Dangerous Industries [Blog]. Injury Facts. https://injuryfacts.nsc.org/work/industry-incidence-rates/most-dangerous-industries/

Kim, D. K., & Park, S. (2021). An analysis of the effects of occupational accidents on corporate management performance. Safety Science, 138, 105228.

Kim, S.-C., Kim, Y.-W., Park, K. S., & Yoo, C.-Y. (2015). Impact of measuring operational-level planning reliability on management-level project performance. Journal of Management in Engineering, 31(5).

Kim, Y.-W., & Ballard, G. (2010). Management Thinking in the Earned Value Method System and the Last Planner System. Journal of Management in Engineering, 26(4), 223–228.

Kjellén, U., Boe, K., & Hagen, H. L. (1997). Economic effects of implementing internal control of health, safety and environment: A retrospective case study of an aluminium plant. Safety Science, 27(2–3), 99–114.

Latiffi, A. A., Carrillo, P., Ruikar, K., & Anumba, C. J. (2009). The need for performance measurement in construction strategy development: A current scenario. Association of Researchers in Construction Management, ARCOM 2009 - Proceedings of the 25th Annual Conference, 403–412.

Neely, A., Richards, H., Mills, J., Platts, K., & Bourne, M. (1997). Designing performance measures: A structured approach. International Journal of Operations & Production Management, 17(11), 1131–1152.

OSHA. (2020). Commonly Used Statistics. OSHA. https://www.osha.gov/data/commonstats

Pavlov, A., & Bourne, M. (2011). Explaining the effects of performance measurement on performance: An organizational routines perspective. International Journal of Operations & Production Management, 31(1), 101–122.

Penaloza, G. A., Saurin, T. A., & Formoso, C. T. (2020). Monitoring complexity and resilience in construction projects: The contribution of safety performance measurement systems. In APPLIED ERGONOMICS (Vol. 82). ELSEVIER SCI LTD.

Pollack, J., Helm, J., & Adler, D. (2018). What is the Iron Triangle, and how has it changed? International Journal of Managing Projects in Business, 11(2), 527–547.

Richard, P. J., Devinney, T. M., Yip, G. S., & Johnson, G. (2009). Measuring Organizational Performance: Towards Methodological Best Practice. Journal of Management, 35(3), 718–804.

Righi, A. W., Saurin, T. A., & Wachs, P. (2015). A systematic literature review of resilience engineering: Research areas and a research agenda proposal. Reliability Engineering & System Safety, 141, 142–152.

Robinson, H. S., Anumba, C. J., Carrillo, P. M., & Al-Ghassani, A. M. (2005). Business performance measurement practices in construction engineering organisations. Measuring Business Excellence, 9(1), 13–22.

Sabone, M., & Addo-Tenkorang, R. (2016). Benchmarking performance measurement systems in Botswana's construction sector. Journal of Construction Project Management and Innovation, 6, 14.

Sapeciay, Z., Wilkinson, S., Costello, S. B., & Adnan, H. (2019). Building Organisational Resilience for the Construction Industy: Strategic Resilience Indicators. IOP Conference Series: Earth and Environmental Science, 385, 012068.

Saurin, T. A., Formoso, C. T., & Cambraia, F. B. (2008). An analysis of construction safety best practices from a cognitive systems engineering perspective. Safety Science, 46(8), 1169–1183.

Saurin, T. A., Formoso, C. T., & Guimaraes, L. B. M. (2004). Safety and production: An integrated planning and control model. Construction Management and Economics, 22(2), 159–169.

Sibiya, M., Aigbavboa, C., & Thwala, W. (2015). Construction Projects' Key Performance Indicators: A Case of the South African Construction Industry. In Y. Wang, T. Olofsson, G. Q. Shen, & Y. Bai (Eds.), Iccrem 2015: Environment and the Sustainable Building (pp. 954–960). Amer Soc Civil Engineers.

Sousa, S. R. de O., Melchior, C., Da, S. W. V., Zanini, R. R., Su, Z., & da, V. C. P. (2021). Show you the money – firms investing in worker safety have better financial performance: Insights from a mapping review. International Journal of Workplace Health Management, ahead-of-print(ahead-of-print).

van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. Scientometrics, 84(2), 523–538.

Van Eck, N. J., & Waltman, L. (2013). VOSviewer manual. Leiden: Univeristeit Leiden, 1(1), 1–53.

Venkatraman, N., & Ramanujam, V. (1986). Measurement of Business Performance in Strategy Research: A Comparison of Approaches. Academy of Management Review, 11(4), 801–814.

Xu, J., Cheung, C., Manu, P., & Ejohwomu, O. (2021). Safety leading indicators in construction: A systematic review. Safety Science, 139.

Yang, H., Yeung, J. F. Y., Chan, A. P. C., Chiang, Y. H., & Chan, D. W. M. (2010). A critical review of performance measurement in construction. Journal of Facilities Management, 8(4), 269–284.