

PERCEPTION OF PROJECT MANAGEMENT AMONG CONSTRUCTION WORKERS: A SURVEY IN DENMARK

Stephanie T. Salling¹, Cristina T. Pérez², and Søren Wandahl³

ABSTRACT

According to the Lean philosophy, continuous improvement relies on an investment in people, and Lean methods and tools cannot be sustained without labor. Hence, knowledge about workers' job satisfaction is highly valuable for improving the efficiency of the construction industry. For that reason, a survey was created and applied to understand the level of job satisfaction among construction workers in Denmark within three areas: (1) Project Management; (2) Work Environment; and (3) Health and Safety. The descriptive survey method was adopted as the primary research approach. The study comprised five steps: (1) link to the theoretical level; (2) survey design; (3) pilot test; (4) data collection; and (5) data analysis. This paper presents a part of the survey results concerning project management. The results reveal the most significant issues to be unrealistic commitment plans and poor communication with management and other stakeholders. Respondents generally feel encouraged to suggest improvements to the current practice, however, their knowledge about Lean concepts is very limited. The paper presents two contributions: (1) the identification of the perception of project management among construction workers in Denmark and (2) a survey template that can be applied by others to understand construction workers' job satisfaction levels.

KEYWORDS

Job satisfaction, survey, lean construction, collaboration, culture of respect.

INTRODUCTION

At the core of the lean philosophy lies the concept of increasing production efficiency by continuously eliminating waste, together with the equally important concept of “respect for people” (sometimes called “respect for humanity”) (Howell et al., 2017; Liker & Meier, 2006; Ohno, 1988). According to the lean philosophy, continuous improvement relies on an investment in people, not equipment or systems (Hakes, 1991), and lean methods and tools cannot be sustained without labor (Emiliani, 2005). In other words, the “respect for people” principle enables continuous improvement (Emiliani, 2006). This concept does not mean creating a stress-free environment with lots of amenities for employees, rather it implies creating challenging environments in which people can learn and grow and are encouraged to raise problems to the surface (Liker & Meier, 2006). Employees are entrusted with more responsibility and authority, which makes them feel empowered (Marksberry, 2011).

¹ Research Assistant, Department of Civil & Architectural Engineering, Aarhus University, Denmark, stsa@cae.au.dk, <https://orcid.org/0000-0001-7088-6458>

² Assistant Professor, Department of Civil & Architectural Engineering, Aarhus University, Denmark, cristina.toca.perez@cae.au.dk, <https://orcid.org/0000-0002-4182-1492>

³ Professor, Department of Civil & Architectural Engineering, Aarhus University, Denmark, swa@cae.au.dk, <https://orcid.org/0000-0001-8708-6035>

According to Howell et al. (2017), behaving in accordance with the “respect for people” principle promotes psychological safety. Psychological safety is a crucial motivating factor for engaging in learning behaviors in project teams, which leads to improved team performance (Bossche et al., 2006). Thus, implementing “respect for people” in the organizational culture can positively impact team effectiveness. The principle is also strongly correlated with job satisfaction (McKinnon et al., 2003).

Despite the emphasis in lean philosophy on the importance of respect for people, the principle is often misunderstood or left out in the implementation process (Coetzee et al., 2019; Emiliani, 2006). Considering the aforementioned dependencies, this could affect project performance and job satisfaction.

In a construction context, job satisfaction has also been identified as one of the most influential motivators for improved labor productivity (Kazaz & Ulubeyli, 2007). Hence, knowledge about workers’ job satisfaction is highly valuable.

In 2016, the Danish trade union 3F conducted a survey among construction workers in Denmark to disclose the issues that the workers found to be most dissatisfying about their jobs (Dalsgaard et al., 2016). The answers showed that the most significant issues were: (1) many heavy lifts on site (reported by 59% of respondents) and (2) too much wasted time due to poor planning of the project (reported by 55%) (Dalsgaard et al., 2016).

Since the 3F national survey in 2016, no other studies have been conducted on a national scale concerning job satisfaction in the Danish construction industry. Moreover, to the authors’ knowledge, no study has been made regarding the general perception of project management, health and safety, and the overall work environment among construction workers in Denmark. The present paper, therefore, presents a comprehensive survey designed to investigate these three themes.

The survey results are too comprehensive to present in full in this paper. Thus, the goal of this paper is understanding the level of knowledge and the subjective perception among construction workers on Danish construction sites of only one of the three themes, namely project management, including knowledge about Lean concepts. Moreover, this paper presents the contribution of a tool in the form of a survey template (available upon request) that other researchers and practitioners can apply to gain knowledge about job satisfaction in other countries. Of course, minor adjustments should be made to ensure relevance in the context where it is applied, e.g., regarding economy and ethnicities. Applying the same survey in other countries would make it possible to compare results and raise the general knowledge level in this important area.

LITERATURE REVIEW

Questionnaires have been widely applied in research to investigate various topics that affect job satisfaction and the mental and physical well-being of employees. Though the phrasing of topics and questions differ among studies, the overall themes are, in many cases, comparable. Table 1 summarizes the main themes treated in the identified previous literature on surveys of workers, mainly within the construction industry, but also including healthcare and social services.

As shown in Table 1, nine themes have been identified among the studies, namely (1) Workers’ contractual characteristics, (2) Rewards, (3) Health and safety, (4) Relations with management, (5) Relations with coworkers, (6) Communication, (7) Worker engagement, (8) Work environment and culture, and (9) Project management. Some studies have included many different themes (Ahmad et al., 2020; Kazaz & Ulubeyli, 2007; Spector, 1985) while others focus on few themes (Dainty, 2007; Han et al., 2019).

Table 1: Themes Evaluated in Worker Surveys

| Reference | (1) Workers' contractual characteristics | (2) Rewards | (3) Health & Safety | (4) Relations with management | (5) Relations with co-workers | (6) Communication | (7) Worker engagement | (8) Work environment and culture | (9) Project management |
|--------------------------------|--|-------------|---------------------|-------------------------------|-------------------------------|-------------------|-----------------------|----------------------------------|------------------------|
| Rani et al. (2022) | X | | X | X | | X | | X | X |
| Ahmad et al. (2020) | | X | X | X | X | X | X | X | |
| Asilian-Mahabadi et al. (2020) | | | X | X | X | | | | X |
| Han et al. (2019) | | | X | | | | | | |
| Gomez et al. (2019) | | | X | X | X | X | | X | |
| Dalsgaard et al. (2016) | | | X | | | X | X | X | |
| Hosseini et al. (2014) | | X | X | X | X | | X | X | |
| Marzuki et al. (2012) | X | X | | X | X | | | X | |
| Chileshe and Haupt (2010) | | X | X | X | X | | X | X | |
| Dainty (2007) | | | | | | X | | X | |
| Kazaz and Ulubeyli (2007) | X | X | X | X | X | X | X | X | |
| Che Hassan et al. (2007) | | | X | X | X | X | X | | X |
| Spector (1985) | X | X | | X | X | X | | X | X |

The first theme concerning workers' contractual characteristics is included in four of the identified studies under different topics, such as Salary package (Rani et al., 2022), Fulfilment of higher order needs (Marzuki et al., 2012), Timeliness of remuneration and Social insurance (Kazaz & Ulubeyli, 2007), and Satisfaction with pay (Spector, 1985). This theme is closely connected with theme 2, rewards, which was mentioned in six studies, whereof three were also mentioning theme 1. Besides the word Rewards (Marzuki et al., 2012), this theme has also been addressed with e.g., Recognition (Ahmad et al., 2020), Incentive payments (Kazaz & Ulubeyli, 2007), and Contingent rewards (appreciation and recognition) (Spector, 1985).

Health and safety, theme 3, is one of the most widely applied themes in the literature, included in ten of the 13 studies presented. The topics within the health and safety questions vary, some examples are Safety supervision and management (Asilian-Mahabadi et al., 2020), Psychological safety (Gomez et al., 2019), and Risk behavior (Che Hassan et al., 2007), besides the general Health and safety monitoring (Han et al., 2019; Kazaz & Ulubeyli, 2007; Rani et al., 2022).

Themes 4 and 5, relations with management and coworkers, respectively, are also closely connected. All studies that have included one have also included the other, except for Rani et al. (2022), where only the theme relations with management is included, referred to in multiple topics, e.g., Collaboration between top management and employees and Project leadership. Other studies phrase the relations with management theme in topics such as Leadership (Ahmad et al., 2020) and Supervision (Spector, 1985), to name a few. Topics regarding relations with coworkers (Chileshe & Haupt, 2010; Hosseini et al., 2014; Kazaz & Ulubeyli, 2007; Marzuki et al., 2012; Spector, 1985) are also called Teamwork (Ahmad et al., 2020) and Social activity opportunities (Kazaz & Ulubeyli, 2007). Theme 6, communication, is mostly referred to with the word communication, except in Kazaz and Ulubeyli (2007), where the topic is called Sharing problems and their results.

The topics that fall under theme 7, worker engagement, have more diverse wordings, such as Empowerment and participation (Ahmad et al., 2020) and Personal role (Che Hassan et al., 2007). Theme 8, work environment and culture, is represented through topics in ten of the 13 studies. Some examples of these topics are Migrant issues and Racism (Dainty, 2007), Caring about each other (Gomez et al., 2019), and Work discipline (Kazaz & Ulubeyli, 2007).

Theme 9, project management, is only being treated in a few studies. In the ones that include this theme, it is also being called Project progress (Rani et al., 2022), Contract management (Asilian-Mahabadi et al., 2020), and Operational procedures (Spector, 1985). Table 2 presents additional information on the 13 studies.

Table 2: Approaches Adopted in Worker Surveys

| Reference | Industry | Area | Method | Resp. | Country |
|--------------------------------|----------|-----------------------------|--------|--------|-------------------|
| Rani et al. (2022) | C | Wellbeing | I + Q | 205 | Malaysia |
| Ahmad et al. (2020) | H | Job satisfaction | Q | 343 | Malaysia |
| Asilian-Mahabadi et al. (2020) | C | Safety | I + Q | 69+393 | Iran, Oman, Syria |
| Han et al. (2019) | C | Safety | Q | 155 | China |
| Gomez et al. (2019) | C | Safety | Q | 64 | USA |
| Dalsgaard et al. (2016) | C | Job (dis)satisfaction | Q | 2.597 | Denmark |
| Hosseini et al. (2014) | C | Job satisfaction | Q | 72 | Australia |
| Marzuki et al. (2012) | C | Job satisfaction | Q | 56 | Indonesia |
| Chileshe and Haupt (2010) | C | Job satisfaction | Q | 65 | South Africa |
| Dainty (2007) | C | Health, safety | I + Q | 68+17 | England |
| Kazaz and Ulubeyli (2007) | C | Productivity | Q | 82 | Turkey |
| Che Hassan et al. (2007) | C | Health, safety, environment | C + Q | 100 | Malaysia |
| Spector (1985) | H & SS | Job satisfaction | Q | 3.148 | USA |

C=Construction; H=Healthcare; SS=Social Services; Q=Questionnaire; I=Interview; C=Checklist

It can be seen from Table 2 that the application of the questionnaires and interviews has been limited to a single country in all of the studies except Asilian-Mahabadi et al. (2020), which included both Iran, Oman, and Syria in their study. Moreover, only half of the surveys have more than 100 respondents. Consequently, the results cannot be used to draw valid conclusions in a broader perspective, such as nationwide or industry wide. Furthermore, some papers (Che Hassan et al., 2007; Dainty, 2007; Kazaz & Ulubeyli, 2007; Marzuki et al., 2012) do not include the applied questionnaire or another representation of the questions asked, which hinders further data collection.

Among the 13 studies, there is only one example of the same questionnaire being applied in a different setting to compare the results, namely the study by Hosseini et al. (2014) which reuses the survey developed by Chileshe and Haupt (2010). Even though there are many similarities between the studies, the different formulations and definitions of topics makes it difficult to directly compare the results, not least because different scales and indexes have been used to evaluate the survey responses. An alignment of surveys across countries would expand the possible learnings and uses of the results.

As mentioned above, only four of the 13 studies include the project management theme explicitly. However, almost all the other themes can be said to arise from project management, be it communication, relations, or contractual characteristics, as these are all results of decisions made within the project management team. Project management is a key element when it comes to understanding job satisfaction and is, therefore, chosen as the focus area for this paper.

RESEARCH METHODOLOGY

The study adopted the survey method as the main research approach. The present survey can be classified as descriptive (Babbie, 1990). Descriptive survey research aims to understand the relevance of a specific phenomenon and describe the distribution of the phenomenon in a population (Forza, 2002). The phenomenon of the present study consists of the job satisfaction of construction workers, and the survey population is construction workers on Danish job sites. The present survey comprised the following five steps (Figure 1): (1) link to the theoretical level; (2) survey design; (3) pilot test; (4) data collection; and (5) data analysis.

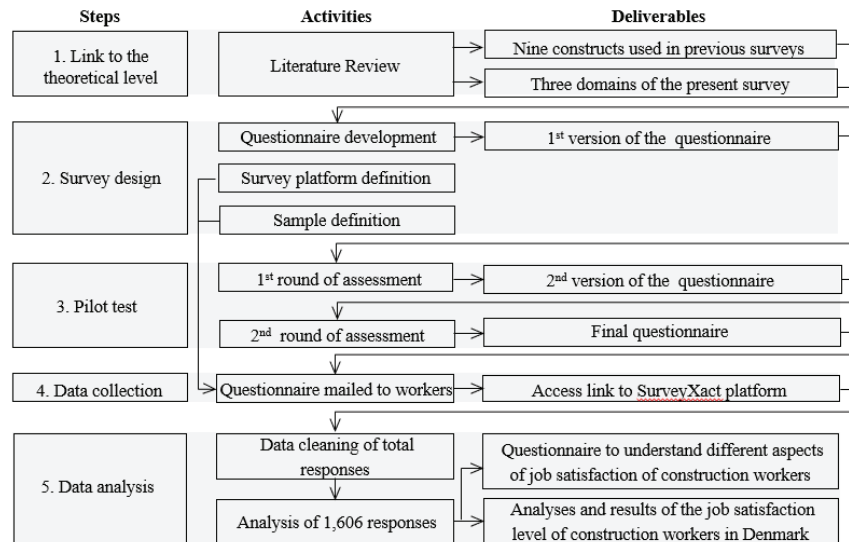


Figure 1: Research Methodology

STEP 1: LINK TO THE THEORETICAL LEVEL

In this step, the authors conducted a literature review to find questions and the constructs (i.e., theoretical concepts) that have already been used in similar studies. As presented in the Literature review section, the authors identified nine constructs generally used in job satisfaction surveys. Lastly, in this step, the authors selected the three main domains that the present survey focuses on: (1) Project Management (PM); (2) Work environment (WE); and (3) Health and Safety (HS).

STEP 2: SURVEY DESIGN

Survey design includes all of the activities that precede data collection. This includes developing the questionnaire and defining the sample. Firstly, the authors identified a comprehensive number of questions and statements from previous studies through the literature review. Then, the questions identified were grouped into the three domains (PM, WE, and HS). Moreover, the authors conducted a reduction of the questions considering their relevance to the construction sector and questions that were too similar.

Secondly, the study population was limited to all construction workers of Danish job sites who are members of a union, including foreign workers. The union membership prerequisite was chosen because it is very common to be part of a union in Denmark, and thus cooperating with the unions for the distribution of the survey provided an opportunity for a large number of potential respondents. Moreover, the survey used non-probabilistic sampling to obtain as much data as possible.

The first version of the questionnaire comprised 48 questions grouped into four sections of 12 questions: (1) demographics (Section 1, S1 for short); (2) project management (S2); (3) work environment (S3); (4) health and safety (S4).

STEP 3: PILOT TEST

The questionnaire was evaluated in two rounds of assessment. The first evaluation consisted of a two-hour online meeting. During this meeting, the group of researchers evaluated the questionnaire together with two industry experts from a professional cooperation organization for Danish unions in the construction industry, called BAT (Danish: *Bygge- Anlægs- og Trækartellet*). Following the experts' suggestions, some questions were added (e.g., S1.10 - Kind of contractual involvement of your company in the current project) and others were removed (e.g., I am satisfied with my involvement in decisions that affect my work).

Then, the questionnaire was reviewed and sent to the experts by e-mail for a second round of evaluation. Moreover, during this round, the access link to the survey platform was sent to the experts to test the viability of the administration of the survey. After making some minor modifications, the questionnaire was finalized. The final questionnaire comprised 39 questions distributed as follows: S1 included 12 questions; S2 included 12 questions; S3 included 8 questions; and S4 included 7 questions.

The questionnaire was initially developed in English and then translated into four other predominant languages spoken on Danish job sites, those being: Danish, Polish, Romanian, and Italian.

STEP 4: DATA COLLECTION

The questionnaire was distributed as a hyperlink included in an e-mail to the respondents. The hyperlink led to SurveyXact; the institutional survey platform used by the university of the researchers. The survey was open for answers from January 4th to 20th, 2023. To increase the probability of success of the data collection, the researchers included the opportunity for respondents to win a reward. This consisted of a draw among all the respondents of 10 giftcards.

STEP 5: DATA ANALYSIS

A total of 2,406 survey responses were collected. To ensure consistency through the presentation of the results, the responses where not all the 39 questions were answered were excluded, which left 1,606 responses for analyzing. The data analysis was conducted with Microsoft Excel. Due to space constraints, the data analyses presented in this paper are mainly descriptive. However, the questionnaire results can also be used for conducting diagnostic and prescriptive analysis.

The demographic profile of the respondents is shown in Figure 2 and Table 3. Most respondents are males (91%) and Danish (95%). About one third (32%) are carpenters, and 58% of the respondents work as skilled workers. The distribution of age and experience is well balanced and similar to the known characteristics of the construction industry.

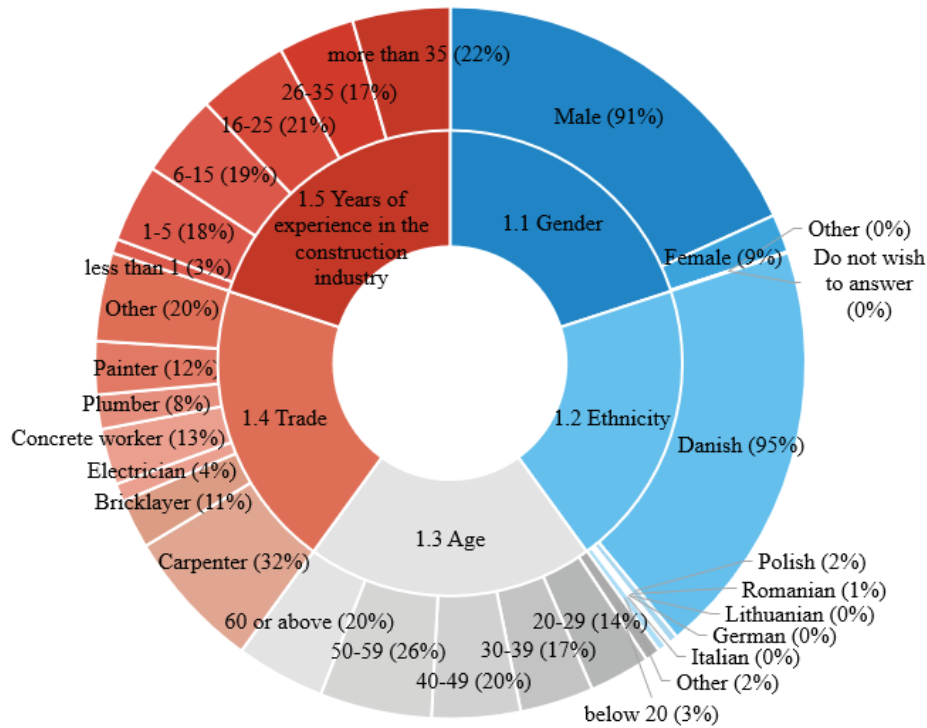


Figure 2: Demographic Profile of Respondents, Part 1

Table 3: Demographic Profile of Respondents, Part 2

| Questions S1.6-S1.8 | Frequency | Questions S1.9-S1.12 | Frequency | | |
|--|----------------|----------------------|--|-----------------------|-----|
| 6. Your position in the company you currently work in | Unskilled | 15% | 9.Origin of the company you currently work in | Danish | 97% |
| | Apprentice | 11% | | Foreign | 2% |
| | Skilled worker | 58% | | I don't know | 1% |
| | Foreman | 8% | 10.Kind of contractual involvement of your company in the current project | Contractor | 44% |
| | Other | 8% | | Subcontractor | 34% |
| 7.Years of experience you have in your current company | Less than 1 | 19% | | Temp agency | 1% |
| | 1-5 | 40% | | Other | 10% |
| | 6-10 | 15% | I don't know | 11% | |
| | 11-15 | 8% | 11.Size of the current project | Less than 1 mio DKK | 23% |
| | More than 15 | 18% | | 1-10 mio DKK | 24% |
| 8.No. of employees in the company you currently work in | 1 | 1% | | 11-100 mio DKK | 14% |
| | 2-9 | 18% | | 101-500 mio DKK | 5% |
| | 10-49 | 34% | | More than 500 mio DKK | 4% |
| | 50-99 | 13% | I don't know | 30% | |
| | 100-249 | 13% | 12.The kind of project you are currently working | Civil works | 15% |
| 250 or more | 17% | New buildings | | 36% | |
| I don't know | 4% | Building renovation | | 49% | |

RESULTS AND DISCUSSION

At the beginning of the Project Management section, the respondents were given a list of factors, which they were asked to rank using a 5-point Likert scale concerning the frequency of occurrence (Figure 3a). They were also asked to choose which two out of six communication issues that causes the most dissatisfaction for them (Figure 3b). Figure 3c shows the results of questions related to worker involvement.

The result of S2.1 (Figure 3a) shows that the factors that affect the flow of the project or cause delays the most according to the respondents are the commitment plan (M1 in Figure 3a) and space and communication issues (M6 and M10 in Figure 3a, respectively). The two factors with which workers are most dissatisfied are Factor 1 – Not getting enough information from

their employers and Factor 6 – poor communication with other stakeholders. The results shown in Figure 3c reveal that more than 50% of the respondents never or rarely participate in planning meetings (S2.3). However, there is a widespread feeling that the management is committed to quality (S2.6), and only a minority of respondents feel like they are not encouraged to suggest possible improvements (S2.7).

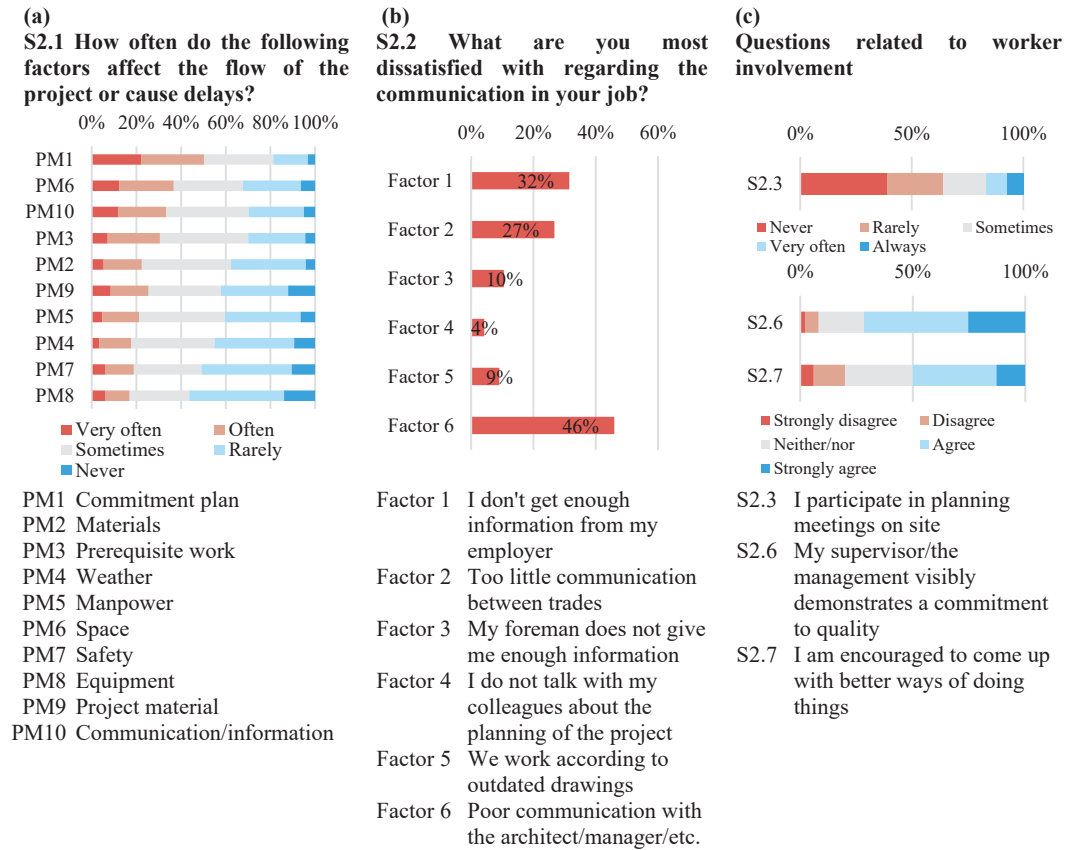


Figure 3: Results for Questions: (a) S2.1, (b) S2.2, and (c) S2.3, S2.6, and S2.7

The respondents were also asked about their knowledge of the project schedule and their own work tasks in the coming week and month. The answers are shown in Figure 4.

S2.5 Regarding the project schedule, I know...

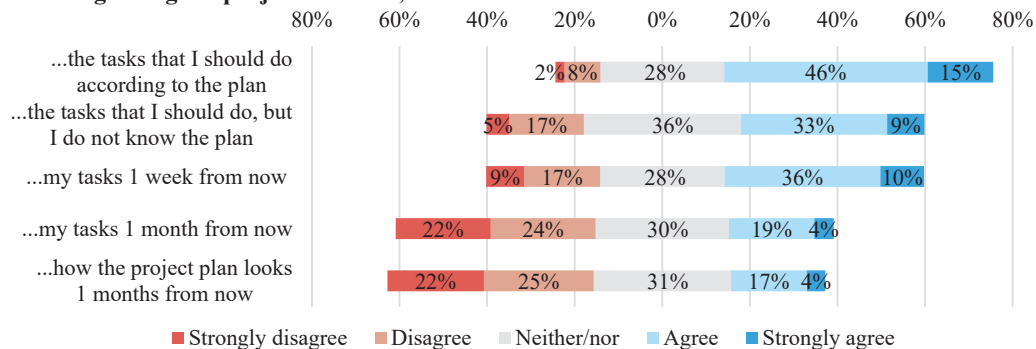


Figure 4: Results for Question S2.5

There is a significant difference in the respondents' knowledge about their imminent tasks compared to their tasks or the project plan in one month. While 46% agree or strongly agree to

knowing about their tasks in the upcoming week, only 23% know what they will be doing in one month.

Figure 5 includes the results of questions related to the workers' perception of their time use. Almost half of the respondents (44%) feel they could use their time more efficiently (Figure 5a), and 57% feel that they waste 1 or 2 hours of their workday on unnecessary tasks (Figure 5b). This corresponds well with the result of S2.10B (Figure 5b) that shows 74% feel they spend at least half of their workday concentrating on their planned tasks.

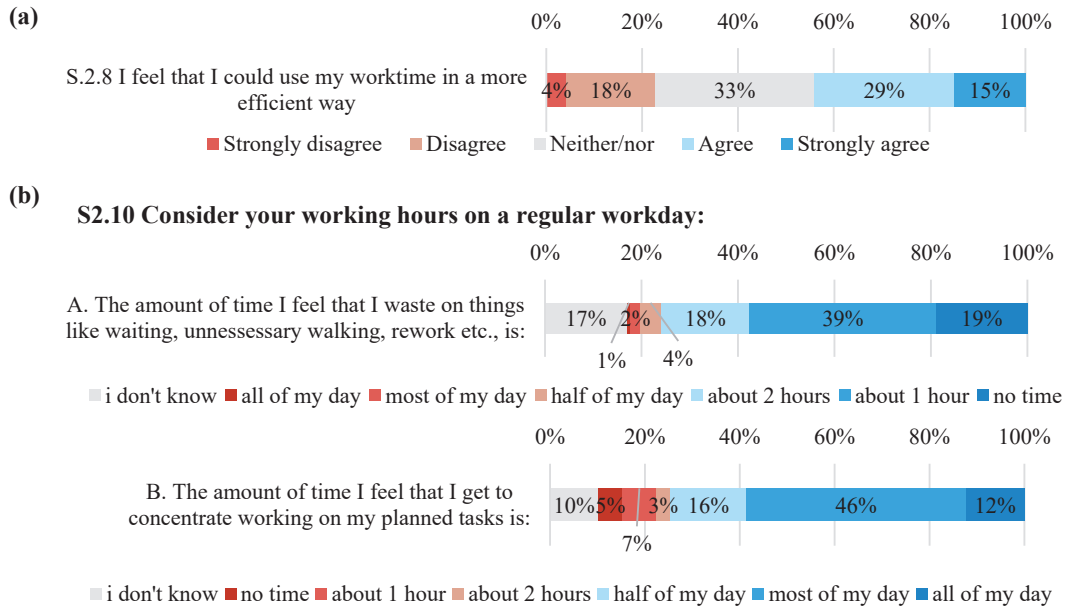


Figure 5: Results for Questions: (a) S2.8 and (b) S2.10 Concerning the Workers' Perception of their Work Time

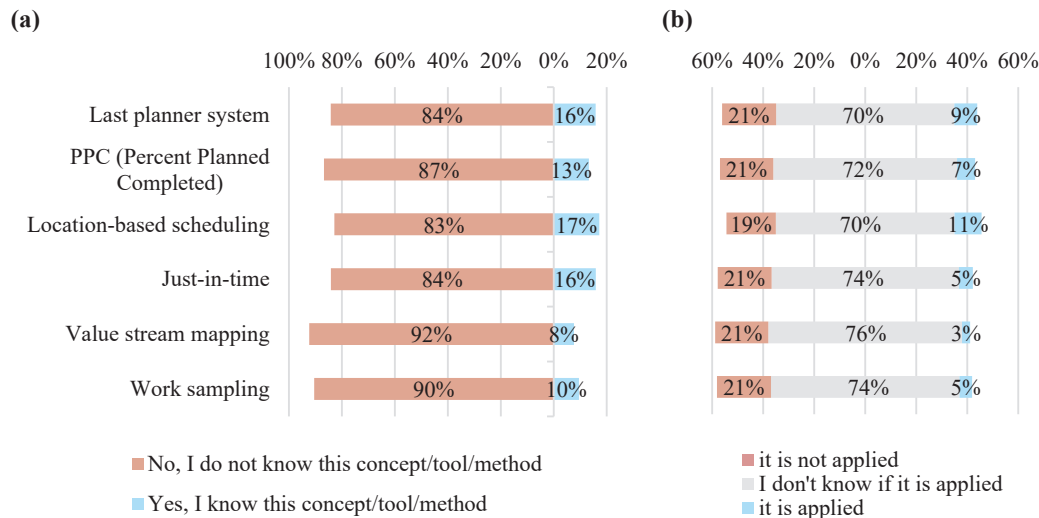


Figure 6: Results for Question: (a) S2.11 Regarding Knowledge, and (b) S2.12 Regarding Application of Lean Concepts/Tools/Methods

The PM section of the questionnaire was concluded with two questions assessing the respondents' knowledge of different Lean concepts/tools/methods (Figure 6). The answers are very clear; only between 8% and 16% of respondents know the six listed Lean concepts.

Consequently, the vast majority, between 70% and 76%, do not know if the concepts are applied in the project they are working on.

CONCLUSION

A high level of job satisfaction promotes psychological safety, which is crucial for workers to engage in learning behaviors and thus be able to improve their performance on construction sites. Psychological safety can be stimulated by acting in accordance with the lean principle of “respect for people”.

This study presented a comprehensive job satisfaction survey, comprising aspects of project management, work environment, and health and safety. The survey was developed based on a literature review which included previous studies concerning surveys among workers. The review revealed nine recurring constructs. These formed the basis of the three aspects included in the present survey.

The survey was applied among construction workers on Danish construction sites. The results included in this paper focus on the project management part of the survey and are mainly descriptive. The most significant issues regarding project management are found to be unrealistic commitment plans and space and communication issues. The most dissatisfying factors among the respondents regarding communication are lack of information from their employer and poor communication with management. Most respondents never or almost never participate in planning meetings. However, they feel encouraged by the management to come up with better ways of doing things, which indicates that many employers are successfully creating challenging environments where employees are entrusted with authority, as suggested by Liker and Meier (2006) and Marksberry (2011). Another finding is that the workers’ level of knowledge about the project plan and their own upcoming tasks is generally low when looking further ahead than one week. The results also clearly show that the knowledge of Lean concepts among construction workers in Denmark is very limited.

There is a large potential in connecting the survey results with the implementation of Lean on Danish construction sites (e.g., Percent Planned Completed), which did not fit within the length limit of this paper. This will be discussed in future publications.

Only a small part of the survey results is presented in this paper. Future publications will include more in-depth analyses of the results of all parts of the survey, including correlations of answers for different questions. Moreover, aggregated analysis based on demographic variables will be conducted, taking into consideration the impact of the demographic pattern of respondents.

The questionnaire developed for this study represents a tool that can be applied by other researchers and practitioners in other countries (template available upon request). This will provide opportunities to compare and learn from the differences and similarities in job satisfaction among construction workers in different parts of the world.

ACKNOWLEDGMENTS

The authors would like to thank the BAT organization for the collaboration and for providing access to their members. The authors are especially grateful for the help from Sidse Buch and Gunde Odgaard, and for the respondents who contributed to the study.

REFERENCES

- Ahmad, N. F. D., Ren Jye, A. K., Zulkifli, Z., & Bujang, M. A. (2020). The Development and Validation of Job Satisfaction Questionnaire for Health Workforce. *Malays J Med Sci*, 27(6), 128-143. <https://doi.org/10.21315/mjms2020.27.6.12>
- Asilian-Mahabadi, H., Khosravi, Y., Hassanzadeh-Rangi, N., Hajizadeh, E., & Behzadan, A.

- H. (2020). Factors affecting unsafe behavior in construction projects: development and validation of a new questionnaire. *Int J Occup Saf Ergon*, 26(2), 219-226.
<https://doi.org/10.1080/10803548.2017.1408243>
- Babbie, E. R. (1990). *Survey Research Methods*. Wadsworth, Belmont, CA.
- Bossche, P. V. d., Gijsselaers, W. H., Segers, M., & Kirschner, P. A. (2006). Social and Cognitive Factors Driving Teamwork in Collaborative Learning Environments. *Small Group Research*, 37(5), 490-521.
- Che Hassan, C. R., Basha, O. J., & Wan Hanafi, W. H. (2007). Perception of Building Construction Workers Towards Safety, Health, and Environment. *Journal of Engineering Science and Technology*, 2(3).
- Chileshe, N., & Haupt, T. C. (2010). The effect of age on the job satisfaction of construction workers. *Journal of Engineering, Design and Technology*, 8(1), 107-118.
<https://doi.org/10.1108/17260531011034682>
- Coetzee, R., van Dyk, L., & van der Merwe, K. R. (2019). Towards addressing respect for people during lean implementation. *International Journal of Lean Six Sigma*, 10(3), 830-854. <https://doi.org/10.1108/ijlss-07-2017-0081>
- Dainty, A. (2007). *Health, safety and welfare of migrant construction workers in UK*. L. University.
- Dalsgaard, M., Skolnik, K., & Nielsen, A. (2016). *Undersøgelse af Arbejdsforhold i Byggeriet*.
- Emiliani, M. L. (2005). Using kaizen to improve graduate business school degree programs. *Quality Assurance in Education*, 13(1), 37-52.
<https://doi.org/10.1108/09684880510578641>
- Emiliani, M. L. (2006). Origins of lean management in America. *Journal of Management History*, 12(2), 167-184. <https://doi.org/10.1108/13552520610654069>
- Forza, C. (2002). Survey research in operations management: a process-based perspective. *International Journal of Operations & Production Management*, 22(2), 152-194.
<https://doi.org/http://dx.doi.org/10.1108/01443570210414310>
- Gomez, S., Bishop, B., Ballard, G., Saenz, M., & Tommelein, I. (2019). *An Active Caring Approach Through Psychological Safety in Construction Projects* Proc. 27th Annual Conference of the International Group for Lean Construction (IGLC),
<https://doi.org/10.24928/2019/0207>
- Hakes, C. (Ed.). (1991). *Total quality management: the key to business improvement*. Springer Science & Business Media.
- Han, Y., Jin, R., Wood, H., & Yang, T. (2019). Investigation of Demographic Factors in Construction Employees' Safety Perceptions. *KSCE Journal of Civil Engineering*, 23(7), 2815-2828. <https://doi.org/10.1007/s12205-019-2044-4>
- Hosseini, M. R., Chileshe, N., & Zillante, G. (2014). Investigating the Factors Associated with Job Satisfaction of Construction Workers in South Australia. *Australasian Journal of Construction Economics and Building*, 14(3), 1-17.
<https://doi.org/10.3316/informit.602823702751152>
10.3316/informit.602823702751152.on
10.3316/informit.602823702751152
- Howell, G., Ballard, G., & Demirkesen, S. (2017). Why Lean Projects are Safer. 25th Annual Conference of the International Group for Lean Construction, Heraklion, Greece.
<https://doi.org/10.24928/2017/0247>
- Kazaz, A., & Ulubeyli, S. (2007). Drivers of productivity among construction workers: A study in a developing country. *Building and Environment*, 42(5), 2132-2140.
<https://doi.org/10.1016/j.buildenv.2006.04.020>
- Liker, J. K., & Meier, D. (2006). *The Toyota way Fieldbook*. McGraw-Hill.

<https://doi.org/10.1036/0071448934>

- Marksberry, P. (2011). The Toyota Way – a quantitative approach. *International Journal of Lean Six Sigma*, 2(2), 132-150. <https://doi.org/10.1108/20401461111135028>
- Marzuki, P. F., Permadi, H., & Sunaryo, I. (2012). Factors Affecting Job Satisfaction of Workers in Indonesian Construction Companies. *Journal of Civil Engineering and Management*, 18(3), 299-309. <https://doi.org/10.3846/13923730.2012.698889>
- McKinnon, J. L., Harrison, G. L., Chow, C. W., & Wu, A. (2003). Organizational Culture: Association with Commitment, Job Satisfaction, Propensity to Remain, and Information Sharing in Taiwan. *International Journal of Business Studies*, 11(1), 25-44.
- Ohno, T. (1988). *Toyota Production System: Beyond Large-Scale Production* (1st ed.). Productivity Press. <https://doi.org/10.4324/9780429273018>
- Rani, H. A., Radzi, A. R., Alias, A. R., Almutairi, S., & Rahman, R. A. (2022). Factors Affecting Workplace Well-Being: Building Construction Projects. *Buildings*, 12(7). <https://doi.org/10.3390/buildings12070910>
- Spector, P. E. (1985). Measurement of Human Service Staff Satisfaction: Development of the Job Satisfaction Survey. *American Journal of Community Psychology*, 13(6), 693-713.